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UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT BULLETIN No. 1189

Washington, D. C. ▼ December, 1923

FRUITS IN WEST VIRGINIA, KENTUCKY, AND TENNESSEE

By

GEORGE M. DARROW, Pomologist
Office of Horticultural Investigations
Bureau of Plant Industry

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INTRODUCTION.

In 1908 a bulletin (*18*) [2] reporting the results of a study of the adaptability of varieties of orchard fruits to the Piedmont and the Blue Ridge Regions of Virginia and the South Atlantic States was published by the Department of Agriculture. The second bulletin (*19*) of this series was published in 1911, and the third (*20*) in 1913. The present bulletin is the fourth of this series and contains the results of a study begun in 1912 of the fruit regions of West Virginia, Kentucky, and Tennessee.

The former bulletins have reported on varieties of orchard fruits only. After the first season's work in this area [3] it seemed advisable to include the small fruits in the investigations, and this was accordingly done. The purpose of this bulletin is to present the results of the investigations (1) by outlining and describing the pomological

[1] In the summer of 1912 W. F. Fletcher, then scientific assistant in the Office of Horticultural and Pomological Investigations, assisted in the field work.

[2] The serial numbers (italic) in parentheses refer to "Literature cited," at the end of this bulletin.

[3] The term "area" is used to denote parts of the country grouped together for convenience in discussion, and in this case refers to the States of Tennessee, Kentucky, and West Virginia. An area of such size divides naturally into regions and sections on account of its geology, soil, topography, and climate. The term "region" is used to denote a division of an area of the United States in which the geologic structure, the soil, the topography, and the climate are in the main similar and the pomological conditions therefore similar. A pomological region may be divided into smaller units called sections, each of which is marked by some characteristics which separate it from the other sections of the region.

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regions of the area and (2) by presenting the information obtained regarding the behavior of fruit varieties in those regions.

While studying the strawberry varieties in the different regions of the area much information on the general culture of that fruit was obtained which has been published as a Farmers' Bulletin (*14*) of the Department of Agriculture.

To obtain the information desired, orchards in all parts of the area were studied. Many of these orchards have been visited each season of the years during which this work was carried on and notes taken on the behavior of the varieties under the varying conditions that have prevailed in the different years. The effect of the soil and climatic conditions on the behavior of varieties was observed. Information was also obtained from the growers on other factors which help to determine the economic value of different varieties, such as the demands of particular markets for certain varieties and the securing of labor to harvest the fruit at the time of ripening. Summaries of such information are given later under each variety.

POMOLOGICAL CHARACTERISTICS OF THE AREA.

HISTORY.

The development of the fruit industry in this area has not been essentially different from that in other parts of the eastern United States. The early settlers from the Atlantic Coast States carried seeds and trees of the various fruits with them. Large seedling orchards were first established and later were followed by grafted and budded fruit. Many of the settlers in Tennessee and Kentucky came from North Carolina and secured their varieties from that State. In the northern part of the area varieties from States farther north were planted, for many of the settlers came from the Northern States.

The development of the apple industry was encouraged in parts of this area by the manufacture of brandy, and by 1850 orchards of 50 acres of grafted apples were established as far south as the southern border of Tennessee.

With the introduction and spread of various orchard diseases and insects and before spraying methods were known, the industry in the southern part of the area began to decline. Along the Ohio River, however, very extensive plantings of the Ben Davis, Rome Beauty, and other apple varieties were made as recently as 1890 to 1900.

In recent years, except in rare instances, plantings have been conservative even in the well-known fruit sections of the area. At present, in Kentucky and Tennessee but few people who have not studied the industry are planting orchards. In West Virginia the plantings also are being made for the most part by those who have had experience in fruit growing. When the development of an industry takes place under such conditions, there is the least danger of heavy loss. There are, of course, in each part of this area orchards which will never be profitable because of bad management, bad selection of varieties, poor location, or poor site. Generally, however, in an

area that develops as slowly as this has, there is less danger from such sources than where planting is overstimulated for any reason.

CENSUS STATISTICS.

The census statistics in 1909 and 1919 on apples, peaches, and strawberries, which comprise the principal commercial fruits in Tennessee, Kentucky, and West Virginia, are presented in Table 1.

TABLE 1.—*Census statistics of apples, peaches, and strawberries in 1910 and 1920.*

Orchard fruits.	West Virginia.		Kentucky.		Tennessee.	
	1920	1910	1920	1910	1920	1910
Apples:						
Trees of bearing age	5,554,731	4,570,948	3,742,936	5,538,267	3,181,659	4,838,922
Trees not of bearing age	1,735,126	2,772,025	1,427,408	2,106,295	1,032,490	2,117,246
Yield in preceding season ..... bushels..	4,189,162	4,225,163	1,280,549	7,368,499	1,258,878	4,640,444
Peaches:						
Trees of bearing age	2,049,862	1,424,582	1,671,044	2,245,402	2,349,656	3,163,737
Trees not of bearing age	651,742	1,441,188	690,483	1,110,744	690,359	1,190,727
Yield in preceding season ..... bushels..	706,411	328,901	459,681	1,623,379	1,285,441	1,579,019
Strawberries:						
Area grown..... acres..	1,006	709	3,112	1,553	10,876	10,761
Yield in preceding season ..... quarts..	840,273	812,049	3,194,624	2,114,929	13,130,904	12,339,584

The census statistics in Table 1 show that the total production of apples and peaches was much greater in 1909 in Kentucky than in West Virginia, while in 1919 the production was reversed. In Tennessee the production of apples in 1919 was much less than that of West Virginia, but the production of peaches greatly exceeded that of West Virginia in 1909, and in 1919 still exceeded it, though to a less extent. In Tennessee and Kentucky, however, the apples and peaches are chiefly consumed in the immediate vicinity of the places in which they are grown, and large quantities are shipped in from other States. The relatively large production in Tennessee and Kentucky comes from a great number of small orchards widely distributed, while in West Virginia it comes from relatively few orchards of large size. In the latter State a large part of both the apple and peach crops is shipped to the large city markets.

SHIPMENTS OF PEACHES IN 1914, 1920, AND 1921.

The shipments of peaches from each section of the United States for the year 1914 were compiled by the Office of Markets of the Department of Agriculture (now a part of the Bureau of Agricultural Economics) and maps were made giving the location of the sections (*59*). The location of the various shipping points in this area may be seen by referring to the map shown as Figure 3 in Department Bulletin 298 and the size of the shipments from each point by referring to Table 2. In 1921 frosts in the late spring caused a crop failure in Kentucky and West Virginia, and no figures are given for that year.

TABLE 2.—*Shipments of peaches from stations in Kentucky, Tennessee, and West Virginia in 1914, 1920, and 1921.*

[Data for 1914 are from United States Department of Agriculture Bulletin 298; those for 1920 and 1921 were furnished by the Bureau of Agricultural Economics. Because of late spring frosts which killed the bloom, no crop was harvested in Kentucky and West Virginia in 1921.]

Shipping station.	Carloads.			Shipping station.	Carloads.		
	1914	1920	1921		1914	1920	1921
Kentucky:				West Virginia—Continued.			
Brooks	26.0	12	.....	Vanderlip	203.5	.....	.....
Shepherdsville	26.0	8	.....	Springfield	177.0	24	.....
Bowling Green	21.5	11	.....	Pattersons Creek	174.0	.....	.....
Sulphur	20.0	.....	.....	French	82.0	1	.....
Stiles	9.0	.....	.....	Sleepy Creek	71.0	.....	.....
Louisville	.....	3	.....	Cherry Run	49.5	19	.....
				Ridgedale	32.3	.....	.....
Total	102.5	34	.....	Globe	30.6	.....	.....
				Petersburg	18.0	38	.....
Tennessee:				Huntington	17.5	.....	.....
Sale Creek	25.5	83	87	Tabler	15.0	20	.....
Cleveland	23.0	24	25	Paw Paw	14.0	2	.....
Dayton	13.0	3	.....	Martinsburg	13.0	5	.....
Harriman	9.5	33	74	Pinto	12.0	.....	.....
Vanleer	6.0	.....	.....	Ridgeway	7.0	.....	.....
Spring City	4.5	1	2	McNeill	6.0	.....	.....
Trenton	3.5	.....	.....	Okonoko	6.0	.....	.....
Tennessee Ridge	3.0	.....	.....	Buffalo	5.0	.....	.....
Cumberland Gap	2.0	.....	.....	Moorefield	4.0	26	.....
Lone Oak	1.0	.....	.....	Little Cacapon	3.8	.....	.....
Lancing	.....	3	.....	Wappocomo	3.2	.....	.....
Rathburn	.....	2	18	Durgon	3.0	.....	.....
Bakewell	.....	2	8	Summit Point	2.5	.....	.....
Whiteside	.....	2	.....	Inwood	.....	16	.....
Graysville	.....	1	1	Green Spring	.....	6	.....
Harriman Junction	.....	.....	2	North Mountain	.....	6	.....
				Graham	.....	3	.....
Total	91.0	154	217	Chester	.....	2	.....
				Letart	.....	1	.....
West Virginia:							
Romney	617.0	170	.....	Total	1,977.9	428	.....
Keyser	411.0	89	.....				

SHIPMENTS OF APPLES IN 1920 AND 1921.

Corresponding figures on the apple shipments are not available for 1914, but Table 3 shows the carload shipments for 1920 and 1921. The shipments are relatively small from Tennessee and Kentucky and large from West Virginia. It will be noted that the shipments and centers of production of peaches are confined chiefly to the northeastern part of West Virginia. The points at which apple shipments originate are more widely distributed, although the northeastern part of West Virginia is also one of the most important apple-shipping sections in this area. Another important apple-shipping section lies along the Ohio River from Huntington north to East Liverpool. In other parts of West Virginia the apple sections are more limited, yet shipments originate at many scattered points. In neither Tennessee nor Kentucky are there large centers of apple production for the general market, though considerable shipments are made from Henderson, Ky., and Ewells, Tenn.

TABLE 3.—*Apple shipments from stations in Kentucky, Tennessee, and West Virginia in 1920 and 1921.*

[Data furnished by the Bureau of Agricultural Economics.]

Shipping station.	Carloads.		Shipping station.	Carloads.	
	1920	1921		1920	1921
Kentucky:			West Virginia—Continued.		
Louisville	18	5	Bunker Hill	119	10
Henderson	9	40	Paw Paw	102	.....
Bowling Green	1	.....	Shepherdstown	85	29
			French	75	5
Total	28	45	Cherry Run	74	3
			Springfield	69	.....
Tennessee:			New Cumberland	63	160
Dayton	1	.....	Guyandotte	47	.....
Ewells	36	.....	Rippon	42	59
Columbia	18	.....	Shenandoah Junction	35	12
Stanton	12	.....	Summit Point	30	9
Nashville	10	.....	Belleville	26	2
Petersburg	9	.....	Duffields	16	.....
Carters Creek	8	.....	Moorefield	16	.....
Franklin	8	.....	Petersburg	15	.....
Pleasant Grove	3	.....	Bedington	14	1
Kenton	2	.....	Raven Rock	13	2
Lancing	2	.....	Green Spring	13	.....
Ripley	2	.....	Harpers Ferry	13	1
Trenton	2	.....	Great Cacapon	12	2
Avondale	1	.....	Gallipolis	9	1
Evansville	.....	.....	Hancock	8	25
Humboldt	1	.....	Parkersburg	8	1
Leeville	1	.....	Willow Island	6	.....
Mercer	1	.....	Fort Spring	5	.....
Tazewell	1	.....	Chester	4	9
Thompson Station	1	.....	Cox Landing	4	.....
Trezevant	1	.....	Kenova	4	.....
			Bens Run	3	.....
Total	120	.....	Point Pleasant	3	.....
			Waverly	3	1
West Virginia:			Halltown	2	1
Martinsburg	763	385	Apple Grove	2	.....
Inwood	546	75	Millwood	1	.....
North Mountain	390	25	Okonoko	1	.....
Charles Town	359	242	Ravenswood	1	.....
Romney	348	4	Arbuckle	1	.....
Tabler	325	36	Glenwood	1	.....
Huntington	306	38	Williamstown	1	.....
Kearneysville	218	31	Engle	.....	1
Keyser	151	9	Zalia	.....	1
Ridgeway	144	14			
Berkeley Springs	134	104	Total	4,630	1,298

SHIPMENTS OF STRAWBERRIES IN 1914, 1920, AND 1921.

With the growth of transportation and increased refrigeration facilities a large industry in supplying early strawberries to northern markets has developed. This industry is located chiefly in eastern and western Tennessee and in the sections adjacent to Nashville, Tenn., and Bowling Green, Ky. In Tennessee and Kentucky the strawberry is the largest cash fruit crop grown. In West Virginia it is unimportant.

The location of the strawberry shipping points in 1914 and 1915 may be seen on the accompanying map. (Fig. 1.) The shipments from each point are given in Table 4 (*60*).

DESCRIPTIONS OF THE POMOLOGICAL REGIONS.

A description of the fruit industry of any large area proceeds naturally by regions, each region embracing a part of that area in which the prominent physical characteristics are in the main uni-

form. Such uniformity is found only when in each region the geologic structure, the soil, the topography, and the climate are similar. Some of the boundary lines of such regions are very definite. The boundary lines of others are indefinite and must in some degree be arbitrary, as so many factors are involved.

TABLE 4.—*Strawberry shipments from stations in Kentucky and Tennessee in 1914, 1920, and 1921.*

[Data for 1914 are from United States Department of Agriculture Bulletin 237 (*60*); those for 1920 and 1921 were furnished by the Bureau of Agricultural Economics.]

Shipping station.	Carloads.			Shipping station.	Carloads.		
	1914	1920	1921		1914	1920	1921
Kentucky:				Tennessee—Continued.			
Bowling Green	75.0	176	158	Milan	13.0	18	29
Middletown	6.0	.....	.....	Soddy	12.0	.....	.....
Kings Mountain	2.0	.....	.....	Dresden	10.0	.....	.....
Louisville	1.0	3	2	East Chattanooga	8.0	.....	.....
Pembroke	.....	32	45	Harriman	8.0	.....	.....
Franklin	.....	31	39	Nashville	6.0	2	1
Oakland	.....	23	40	Rockwood	6.0	.....	.....
Bristow	.....	.....	76	Henderson	5.0	.....	.....
Paducah	.....	.....	19	Roddy	5.0	.....	.....
Elkton	.....	.....	9	Henning	4.0	5	26
Hopkinsville	.....	.....	7	Trenton	4.0	10	15
				Lancing	2.5	6	3
Total	84.0	265	395	Athens	2.0	.....	.....
				Hixson	2.0	.....	.....
Tennessee:				Gibson	2.0	.....	.....
Humboldt	267.0	53	95	Cleveland	1.0	.....	.....
Spring City	110.0	108	151	Coulterville	1.0	.....	.....
Dayton	109.0	179	274	Fruitland	.5	10	14
Evensville	109.0	52	69	Portland	.....	116	4
Sharon	83.0	.....	14	Mitchellville	.....	25	59
Currie	72.0	.....	.....	Boyce	.....	13	39
Curve	71.5	41	36	Rathburn	.....	11	32
Ripley	70.0	22	87	Aroma	.....	7	4
Gates	66.0	61	85	Gibbs	.....	7	.....
Dyer	64.0	22	11	Obion	.....	6	2
Kenton	64.0	16	23	Pennine	.....	5	15
Medina	56.0	24	22	Union City	.....	3	.....
Jackson	52.0	13	122	Covington	.....	2	9
Bradford	39.0	16	16	Fountain Head	.....	.....	26
Bakewell	36.0	.....	1	Graysville	.....	.....	22
Gadsden	35.0	40	32	Newbern	.....	.....	22
Knoxville	30.0	17	8	Dyersburg	.....	.....	13
Halls	27.0	20	71	Sadler	.....	.....	8
Trezevant	25.0	29	17	Harriman Junction	.....	.....	7
Chattanooga	24.0	.....	.....	Melville	.....	.....	4
Bells	23.0	35	53	Friendship	.....	.....	1
Greenfield	18.0	18	17				
Sale Creek	15.5	71	113	Total	1,571.5	1,091	1,683
Rutherford	13.5	8	11				

As a basis for the regions recognized in this bulletin, the physiographic divisions or provinces of the United States made by Fenneman (*15*) have been used. These provinces are based upon geologic structure, topography, and soils, each division consisting of a region mainly uniform in these respects.

The provinces outlined by Fenneman take no account of climate nor the factors which determine it, except as these are influenced by topography. As physiographic and climatic factors together affect and may even determine the pomological possibilities of a region, it is evident that the physiographic provinces must be considered in connection with the climatic factors in order to form pomological regions.

On such a basis, for example, the physiographic Appalachian Valley province as outlined by Fenneman is subdivided. The difference in latitude makes a division of this province necessary, and the difference in elevation near the Tennessee-Virginia boundary line suggests a division into pomological regions at that line. The two parts of this province thus made are called the East Tennessee Valley region and the Virginia Valley and Ridge region and lie partially in the area considered in this bulletin.

The boundary lines of the remainder of the pomological regions of this area are the boundary lines of the physiographic provinces as defined by Fenneman.

The pomological regions[4] parts of which at least are included in this area are: (1) The East Tennessee Valley region, (2) the Virginia Valley and Ridge region, (3) the Cumberland Plateau region,

FIG. 1.—Outline map of the United States, showing the average number of carload shipments of strawberries for 1914 and 1915, together with the approximate shipping season for each region. The dots represent 10 carloads each except where they occur singly, when they may represent any number of carloads up to 10. (Adapted from data in Department of Agriculture Bulletins 237 and 477.)

(4) the Allegheny Plateau region, (5) the Interior Low Plateau region, (6) the Gulf Coastal Plains region.

These regions are shown and their extent and location indicated on the map (fig. 2). By reference to this map the pomological region in which any section is located may be determined. The boundaries used in making this map are as follows:

East Tennessee Valley region.—On the north, the Tennessee-Virginia boundary line, on the Ocowee and Chilowee geological series and the Knox Dolomite and the Younger formations. These are shown on the folios of the United States Geological Survey and the Geological Map of Tennessee. On the south, the Tennessee-Georgia boundary line; on the west the line follows the foot of

[4] The pomological regions here outlined are not necessarily coordinate, but simply natural divisions. Certain sections may later be regarded as coordinate with some classed here as regions, while some classed as regions may later be grouped as sections of a region. Such changes are to be expected in the further development and classification of the knowledge of the fruit industry, itself so recent.

Walden Ridge and the Cumberland Mountain, as shown on the Geological Map of Tennessee.

Virginia Valley and Ridge region.—On the north, the Potomac River; on the east the boundary follows the line between the Cambrian formations and the Cambro-Ordovician formations at the break between the Blue Ridge and the Shenandoah Valley, as shown on the Geological Map of Virginia, and following the Shenandoah River in West Virginia to the Potomac River; on the south, Tennessee-Virginia boundary line; on the west the boundary line continues from the Cumberland Mountains, northward along Stone Mountain, Powell Mountain, Stone Ridge, Back Allegheny Mountain, Cheat Mountain, and Allegheny Front, as shown on topographic sheets and West Virginia Geological Maps.

Cumberland Plateau region.—On the north, the Cumberland River; on the east, the East Tennessee Valley region; on the south, the Tennessee-Alabama boundary line; on the west, the western boundary of the coal area, as shown on the Geological Map of Tennessee.

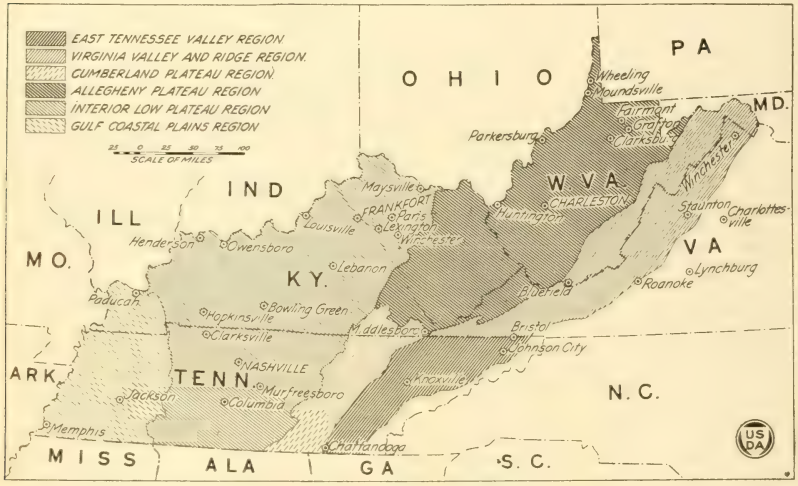

FIG. 2.—Outline map of Tennessee, Kentucky, and West Virginia, showing the pomological regions.

Allegheny Plateau region.—On the north, the Pennsylvania-West Virginia boundary line; on the east, the Virginia Valley and Ridge region; on the south, the Cumberland Plateau region; on the west, the Ohio River to the town of Vanceburg, Ky., where the boundary line follows the Carboniferous-Devonian contact to the Kentucky River. From that point it follows the western edge of the coal measures as shown on the Kentucky Geological Map.

Interior Low Plateau region.—On the north, the Ohio River; on the east, the Cumberland and Allegheny Plateau regions; on the south, the Tennessee-Alabama boundary line; on the west, the Tennessee River.

Gulf Coastal Plains region.—On the north, the Ohio River; on the east, the Tennessee River; on the south, the Tennessee-Mississippi boundary line; on the west, the Mississippi River.

In order that the limits of the regions lying within the area covered by this bulletin may be more clearly defined and the character of each region better understood, brief descriptions of the more important physical and pomological features are given.

The three pomological regions lying nearest the Atlantic coast—the Atlantic Coastal Plain, Piedmont, and Blue Ridge regions—are outside the area under consideration. The Atlantic Coastal Plain region has been outlined and described in Bureau of Plant Industry Bulletins 135 (*18*) and 194 (*19*). The Piedmont and Blue Ridge regions are described in Bureau of Plant Industry Bulletin 135.

EAST TENNESSEE VALLEY REGION.

PHYSICAL FEATURES.

North of the Tennessee-Virginia boundary line the altitude of the Appalachian Valley physiographic province rises above 2,000 feet. The altitude of that part north of this line together with its northern latitude differentiates it from that part in eastern Tennessee. The State boundary line, therefore, is made the boundary between the East Tennessee Valley region and the Virginia Valley and Ridge region. The eastern boundary of this region is defined by the western base of the ranges of mountains which mark the boundary between Tennessee and North Carolina. To the south the East Tennessee Valley region extends into Georgia and Alabama. Its western boundary follows the eastern base of Walden Ridge from the vicinity of Chattanooga, Tenn., northeast to Cumberland Gap.

The topography of this region is characterized by many long parallel ridges which are elevated to a considerable height and run lengthwise of the valley. The altitude of the region varies from about 650 feet at Chattanooga near the Tennessee River to from 2,000 feet to 2,500 feet at the summits of the ridges near the Virginia line.

There are many different types of soil in this region. For descriptions of these types and their distribution the reader is referred to the publications of the Tennessee Agricultural Experiment Station (*44* and *45*) and to the soil surveys made by the Bureau of Soils (*40* and *50*) of the United States Department of Agriculture. Anyone wishing information about a particular section should write to these sources of information. The soils of limestone origin have proved particularly desirable for fruit growing, and most of the orchards are located on them. They are underlain by retentive clay subsoils, which help to make conditions favorable to fruit growing.

POMOLOGICAL FEATURES.

Three fruits, apples, peaches, and strawberries, are grown extensively in this region. On the higher slopes of the long ridges there are many good orchard sites, and profitable apple and peach orchards are found on them. The ridges running parallel to Walden Ridge of the Cumberland Plateau and located a few miles to the east of it have been regarded as especially suitable, and in this section are the largest centers of production for the general market. Figure 3 shows a typical peach orchard located on one of these ridges. Winter apples such as the Winesap and others belonging to its group, are the leading varieties grown in this region. In the southern part some fruit for the early apple markets of the North are grown. The Elberta is the principal peach variety and ripens immediately after the Elberta season is ended in the peach section near Fort Valley, Ga.

Because of good transportation facilities and the earliness of the season of ripening, strawberries are grown in the section adjacent to the Tennessee River between Chattanooga and Harriman, and also near Cleveland, Knoxville, and Maryville. Near Chattanooga the Klondike is the principal variety, while further north, about Dayton, Knoxville, and Maryville the Aroma is the leading berry.

VIRGINIA VALLEY AND RIDGE REGION.

PHYSICAL FEATURES.

To the north the Virginia Valley and Ridge region goes beyond the Maryland-Virginia State line. Its eastern boundary is defined by the western base of the Blue Ridge Mountains in Virginia. Its southern boundary is the Tennessee-Virginia State line. It is bounded on the west successively by Stone Mountain, Powell Mountain, Stone Ridge, Back Allegheny Mountain, Cheat Mountain, and Allegheny Front. Only a part of this region is located within the area considered in this bulletin, yet that part is one of the most important pomological divisions of the area.

Long parallel ridges similar to those in the East Tennessee Valley region are characteristic of this region also, though the ridges are

FIG. 3.—A typical 4-year-old Elberta peach orchard at Sale Creek, Tenn., on one of the ridges of the East Tennessee Valley region.

usually higher and are called mountain ridges. Some of these mountain ridges rise to an altitude of more than 3,500 feet, while the summits of many are from 500 to 1,000 feet above the valleys below them.

There are many soil types in this region, the importance of which in their relation to orchard income may be gathered from Table 5, taken from a bulletin of the West Virginia Experiment Station (*3*). The records in this table were obtained in 1912 and 1913 in Berkeley County, one of the principal fruit-growing counties in this region.

The data in Table 5 show that somewhat more profitable results are found, on the average, from those orchards growing on the Apple Pie Ridge soils. However, many orchards that are well cared for on the limestone soils are as profitable as those on Apple Pie Ridge soils. The red-shale lands give the next highest returns: these are followed by the yellow shales, while the lowest returns are

from the black-slate lands. Some few orchards on the yellow-shale soils which are fertilized liberally with the addition of leguminous cover crops are growing nicely; however, it is questionable whether they will ever be very profitable, unless this artificial feeding is constantly kept up. Although this soil is cheaper than the limestone soil, it is doubtful whether in the long run it will prove as profitable an investment. Those shale soils in which considerable clay is found, as in the soils back of North Mountain, seem to be better suited for trees than the straight shale soils containing no clay. Trees show lack of care and decline quickly on these soils unless well managed. Since peaches do better than apples on the lighter soils, they would probably thrive better than apples on the shale soils. This is found to be true on the red-shale soils, where peaches are doing especially well (*3*).

TABLE 5.—*Yields and income of apple orchards on different types of soil in West Virginia.*

Type of soil.	Apple orchards.			3-year average, per acre.	
	Number.	Area (acres).	Average age (years).	Yield (barrels).	Income (gross).
Apple Pie Ridge	32	941	17	54.5	$130.00
Hagerstown loam (limestone)	32	710	17	47	100.00
Hagerstown shale loam (black slate)	9	200	15	18	38.00
Yellow shale or soapstone	11	367	15	20	43.00
Penn sandy loam (red shale)	2	56	16	33.3	73.34

It is probable that better management of the orchards on the soil of the Apple Pie Ridge may have accounted in part for the better yields on this type of soil. Further, orchards on this ridge have good air drainage and may be better situated in this respect than other soils. Factors such as these quite probably have caused larger yields from orchards on the Apple Pie Ridge. It is, however, likely that much of the dissimilarity in yields between orchards on the various types of soil is due to differences in the fertility of such soils. Similar soil types are found in other parts of this region.

POMOLOGICAL FEATURES.

Apples and peaches are the important commercial fruit crops of this region. Much of the land now devoted to these fruits was formerly in forest and is adapted only to forest trees and orchards. Because of this and because such excellent orchard sites with good locations may be found, the fruit interests of this region are likely to be permanent.

The center of the fruit-growing industry is located in that part of the region drained by the Potomac River system. Reference to Table 2, showing the railroad stations making car-lot shipments of peaches in 1914, will indicate the extent of its development as a peach-growing section. It is becoming even more highly developed as an apple-growing section. Long parallel ridges, elevated to a considerable height above the intervening valleys, furnish many favorable sites for orchards. Figures 3, 4, 5, and 6 show typical orchards in this section.

That part of the region which is drained by the Kanawha River system has not yet been extensively developed. The extremely broken nature of much of this section of the region and its distance from large markets has caused orchard development to be less rapid than in other sections more favorably located. Many small apple and peach orchards, however, indicate that as far as the development of fruit is concerned the higher elevations in this section are well adapted to fruit growing.

The varieties of apples grown most extensively in this region are York Imperial, Ben Davis, Grimes Golden, Gano, Stayman Winesap, and Arkansas. The peach varieties grown are selected to ripen in sequence throughout the season, beginning with Carman and ending with Bilyeu.

FIG. 4.—A typical York Imperial apple orchard at Winchester, Va., in the Shenandoah Valley of the Virginia Valley and Ridge region. All operations in such an orchard can be done at less cost than where the contour is as broken as in Figure 7.

CUMBERLAND PLATEAU REGION.

PHYSICAL FEATURES.

The Cumberland Plateau region lies chiefly in Tennessee. Its northern boundary is the Cumberland River. The eastern boundary is the western boundary of the East Tennessee Valley region. The southern boundary of this pomological region does not coincide with the physiographic region, but terminates near the Alabama-Tennessee line, while the physiographic region extends much farther south. Its western boundary is irregular and is clearly defined by a marked drop in elevation and a change in the character of the country.

The Cumberland Plateau region is relatively level, having an average altitude of about 1,800 feet, or nearly 1,000 feet higher than either the East Tennessee Valley region or the Highland Rim of the Interior Low Plateau region, between which it is located.

The elevation of this region causes it to be exposed to relatively low temperatures late in the spring, while its southern latitude makes it subject to warm days, which start the buds very early. Spring frosts which kill the bloom of fruit trees are likely to occur. The

characteristically level surface of this region offers few sites sufficiently elevated above the surrounding country to afford atmospheric drainage and thus escape these late spring frosts.

The soils of this region are principally sandy loams which support a fair forest growth but are decidedly lacking in fertility. The cultivated soils are shallow, the depth to the underlying sandstone generally ranging from 1 to 4 feet.[5]

POMOLOGICAL FEATURES.

Because of the untimely frosts and because the soils are lacking in fertility this region is not adapted to orcharding. Varieties may be originated, however, which will prove especially valuable in this region. Indications of this are seen in the varieties of peaches which have been developed by A. E. Payne of Cumberland County, Tenn. These varieties have proved better adapted to the conditions at Cross-

FIG. 5.—Apples and peaches interplanted at Keyser, W. Va. Note the very long rows made possible by the topography.

ville than the standard varieties. At the present time the Winesap is the principal apple variety grown. Very little fruit other than apples is produced.

ALLEGHENY PLATEAU REGION.

PHYSICAL FEATURES.

The Allegheny Plateau region covers eastern Kentucky and the larger part of West Virginia. Its southern boundary is the northern boundary of the Cumberland Plateau region. Its eastern boundary is the western boundary of the Virginia Valley and Ridge region. Extending from this boundary line the region covers the rest of West Virginia and reaches on the north to the boundary line between West Virginia and Pennsylvania. In Kentucky its western boundary is very irregular. A line from Vanceburg southwest through Berea to the Cumberland River indicates the approximate boundary. The line between the bluegrass section of the Interior Low Plateau region and

[5] For further information on the soils of the Cumberland Plateau region, see the following references: Ayrs and Hill (6), Mooers (44, 46), Waldrop (68), Wilder and Geib (71).

the Allegheny Plateau region is very marked, though irregular. The bluegrass section is comparatively level, while the Allegheny Plateau region consists of broken hill country. South of the bluegrass section the western edge of the coal fields marks the boundary line of the Allegheny Plateau region.

The physical characteristics of this region are quite different from those of the other regions of the area. The valleys are steep and gorgelike; the main streams, such as the Kanawha River, occupy canyons: flatlands of any extent are seldom found. It is a country of hills and valleys with so little flatland that the water everywhere falls upon a slope, and the run-off is heavy; floods due to spring rains and the melting of late winter snows are common (*7*). The whole region at one time was covered with forests and the remoter parts

FIG. 6.—An apple orchard (foreground) at Keyser, W. Va., with a peach orchard in the background.

are still wooded. When the hillside farms are cleared of timber, the fields are cultivated for a few years and then abandoned for a new site. This is particularly true in Kentucky, where abandoned clearings are quickly gullied and the thin soil washed away. Farther north in West Virginia, and especially in northern West Virginia, the humus is retained longer in the soil, and the washing does not come so quickly.[6]

The northern Panhandle of West Virginia is a distinct section of this region. Its topography is similar to that of the rest of the region, but because of its northern latitude its climate is more like that of northern fruit regions.

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[6] For further information on the soils of the Allegheny Plateau region, see the following references: Averitt (*4*), Burke and others (*10*), Caine and others (*11, 12*), Griffen and Ayrs (*23*), Latimer and others (*30–38*), Meeker and Latimer (*43*), Mooney and Latimer (*52, 53*), Roberts (*56*), Shedd (*58*).

POMOLOGICAL FEATURES.

Much of that part of the Allegheny Plateau region lying in Kentucky is valuable at present chiefly for its immense deposits of coal and for its forest covering. The soils are thin and wash easily. The country is broken and much of it not readily accessible. Good orchard sites are found occasionally and utilized, but usually the fruit from such orchards is sold locally. In a rather narrow strip along the western border of this part of the region the conditions are more favorable, and there are profitable apple and peach orchards at many places. The more important apple varieties are the Winesap, Grimes Golden, Rome Beauty, Ben Davis, and York Imperial, while the peach orchards are composed largely of the Elberta variety.

In the West Virginia portion of this region the country is as broken as in Kentucky, but because the humus is retained in the soil

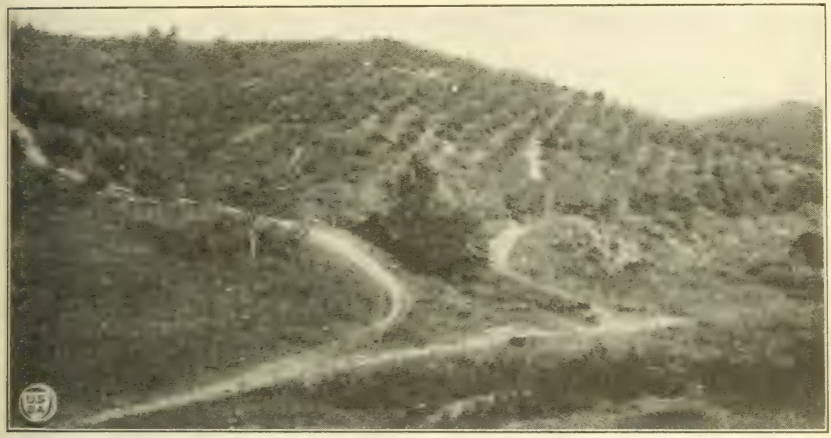

FIG. 7.—A typical apple orchard at Gallipolis Ferry, W. Va., in the Allegheny Plateau region of West Virginia, bordering on the Ohio River.

much better the soils do not wash as badly and are more fertile than those in Kentucky. Because the country is so broken it is not particularly well adapted to general farming. In some parts grazing has been found profitable. In other parts the country is so rough that it should remain devoted to forests. Where the hills are not too steep and the contour not too broken good orchard sites are found.

On the hills along the Ohio River an important apple section has been developed, while occasional individual orchards are situated, for the most part, on the higher slopes of the hills throughout the interior of West Virginia. Because of the danger of washing, very few of these orchards are cultivated. Figures 7 and 8 show typical orchards in this part of the region.

The variety of apple commonly grown and characteristic of the portion of this region in West Virginia north to the Panhandle is the Rome Beauty. Other important varieties grown are Grimes Golden, York Imperial, Ben Davis, Gano, and Stayman Winesap. Fruits other than the apple are of minor importance.

In the northern Panhandle of West Virginia the outlook for fruit growing is not promising, because for a distance of 1 to 3 miles east of the Ohio River soot from the chimneys of the factories along the river covers the fruit while still on the trees and makes it necessary to wipe the apples before marketing them. The fruit of some varieties is so stunted in growth by the soot as to become almost unmarketable. Aside from the soot, however, the conditions are favorable to orcharding. The Willowtwig is the principal variety grown. Other varieties common in this section are the Ben Davis, Grimes Golden, Baldwin, and Hubbardston.

INTERIOR LOW PLATEAU REGION.

PHYSICAL FEATURES.

The Interior Low Plateau region occupies the greater part of Kentucky and a large part of middle Tennessee. To the north it extends

FIG. 8.—Young apple and peach orchards at Parkersburg, W. Va., in the Allegheny Plateau region. Part of these orchards are in sod, and only a space around each tree is kept tilled. Compare with Figure 4.

to and beyond the Ohio River in certain places. Its eastern boundary is the western boundary of the Cumberland Plateau and Allegheny Plateau regions. Southward it extends beyond the Tennessee-Alabama boundary line and westward to the Tennessee River, which forms the eastern boundary of a small section of the Gulf Coastal Plains region. Many subdivisions of this Interior Low Plateau region could be made to correspond with the physiographic subdivisions, such as the Highland Rim, the Nashville basin, the bluegrass, and the western coal-fields sections. The pomological features of these sections do not vary greatly at present, and the names are used only for convenience in describing the region.

The altitude of this region ranges from about 350 feet above sea level along the river bottoms to more than 1,000 feet near the Cumberland Plateau region. The hills do not usually rise more than 100 feet above the surrounding country, though in certain localities higher relative elevations occur.

The Nashville basin and bluegrass sections of the region are composed of rolling plains with soils derived from limestone, making very fertile farm lands.[7] Bluegrass grows naturally on such soils, and they are usually considered very valuable for general farming. Surrounding the bluegrass section of Kentucky is a broken country in which the soils are usually thin. This section borders on the Ohio River from Louisville to Vanceburg. In some places this strip is comparatively wide, as in the vicinity of Newport, while in other places it is very narrow, as at Maysville. That portion of this surrounding border to the east is included in the Allegheny Plateau region and has been discussed previously.

A section similar to that which surrounds the bluegrass section of Kentucky surrounds the Nashville-basin section of Tennessee and is called the Highland Rim. The soils of the Highland Rim are very variable and are described in Tennessee Agricultural Experiment Station Bulletin No. 102 (*47*).[8]

Some of these types of soil are very poor, while others are fertile. Many parts of this section are subject to late spring frosts.

Another natural division of the Interior Low Plateau region is the western Kentucky coal fields. This section is hilly, and the soil for the most part washes badly and is not very fertile.

The remainder of the Interior Low Plateau region is, for the most part, rolling fertile farm land with low hills in some places.

POMOLOGICAL FEATURES.

Three fruits, apples, peaches, and strawberries, are grown extensively on a commercial basis in the Interior Low Plateau region. In no part of this region, however, is there a large section particularly adapted to orcharding. Orchards in the vicinity of the large cities partially supply the local markets, and localities having a few good orchards are scattered throughout the region. Thus, from orchards near Columbia, Franklin, and Portland, Tenn., early apples are sent to northern markets. Near Henderson, Bowling Green, Vine Grove, and Alexandria, Ky., and Tennessee Ridge, Tenn., are localities in which winter apples are grown. Peaches are grown near Shepardsville, Alexandria, and Bowling Green, Ky., and to a slight extent at some points in Tennessee. Figure 9 shows a typical peach orchard of the section near Bowling Green.

The bluegrass sections of this region consist of very rich farming lands. Very few such lands have sufficient relative elevation to furnish good air drainage for orchards. Because of the danger of late spring frosts and because of their value for general farming these sections are not adapted to commercial orcharding.

Where hills rise to a sufficient height to furnish good air drainage and along the Ohio River, there are small sections which furnish sites that have been successfully utilized in growing apples and

[7] For information on the soils on the rolling-plains portion of the Interior Low Plateau region, see the following references: Allen and Bushnell (*2*), Averitt (*4*), Burke and others (*8, 9, 10*), Griffen and Ayrs (*22*), Jones (*27, 28*), Marean (*42*), Rice and Geib (*55*), Roberts (*56*), Shedd (*58*).

[8] For further information on this region, see the following references: Agee and others (*1*) Ayrs and others (*5, 6*), McLendon and Zappone (*41*), Mooers (*44, 45*), Mooney and others (*49, 51*), Rogers and Derden (*57*), Smith and Bennett (*61*), Waldrop (*68*).

peaches. The variety of peach chiefly grown is the Elberta. About Bowling Green, Ky., the Carman and Champion also are grown. The Winesap is the common winter-apple variety in both home and commercial orchards in this region. In the extreme northern part of Kentucky, near Covington, apple varieties, such as the York Imperial and Grimes Golden, are grown as much as the Winesap. In the early-apple orchards of Tennessee, although many varieties are grown, the Oldenburg and Fanny are the principal ones. To some extent in Kentucky the Yellow Transparent, Early Harvest, and Wealthy are grown also for the early-apple markets.

Strawberries for the general markets are grown about Bowling Green and Louisville, Ky., and to a less extent about Nashville, Tenn., and Covington, Ky. Under proper management they are profitable in each of these localities. About Nashville the Gandy and Klondike

FIG. 9.—A peach orchard at Bowling Green, Ky., in the Interior Low Plateau region. The orchard is about 20 years old and has borne several crops since this picture was taken.

are grown chiefly; about Bowling Green the Aroma; about Louisville the Aroma, Gandy, and Haverland; and about Covington the Aroma, Gandy, Warfield, and Dunlap varieties. Figure 10 shows a typical field in this region.

GULF COASTAL PLAINS REGION.

PHYSICAL FEATURES.

The Gulf Coastal Plains region is bounded on the east by the Tennessee River and extends beyond the limits of the area in the other directions. It is composed of rather level country lying between 350 and 500 feet above sea level.

Along the Mississippi River in this region there are bottom lands usually too poorly drained to be adapted to fruit growing. Rising

from these bottom lands is a bluff section which borders the Mississippi River from its juncture with the Ohio River to southern Tennessee. In a narrow strip along this bluff the aid drainage is very good and the soil deep and fertile. Between the bluff section and the Tennessee River the land is rolling and well adapted to general farming.[9]

POMOLOGICAL FEATURES.

Early apples, peaches, strawberries, and blackberries are the fruits grown for the general markets. In the bluff section along the Mississippi River apple orchards when well cared for bear regular crops of fruit of very high color and finish, and the conditions seem especially favorable to the development of orchards. At present the apple orchards of this section consist mostly of fall and winter varieties.

FIG. 10.—A field of Aroma strawberries at Bowling Green, Ky., in the Interior Low Plateau region. Photographed May 26, 1913.

The remainder of this region is so well adapted to general farming that it is not likely to become an important orchard section. Certain localities, however, offer peculiar advantages to the fruit grower, and orchards are found in such places. Some of these orchards furnish early apples for northern markets, and others partially supply the local winter-apple market. Many varieties of early apples are grown, while the Winesap is the principal winter sort. Figures 11 and 12 show young apple orchards of this region.

Some peach orchards, chiefly of the early-ripening varieties, are scattered throughout this region.

Strawberries for the northern markets form the principal fruit industry of this region. The more nearly level lands have been selected for strawberries, as the silt soils easily wash away from or over the plants if there is much slope. The attitude of the growers

[9] For detailed information on the soils of this region, see the following references: Averitt (*4*), Carr and Bennett (*13*), Jones (*29*), Lyman and others (*39*), Mooers, (*44*, *45*), Mooers and Robert (*48*), Rice (*54*), Roberts (*56*), Shedd (*58*).

has been in favor of an extensive rather than an intensive industry, and many farmers have 25 to 50 acres of berries, while some have 100 acres or more. The Klondike variety seems particularly well

FIG. 11.—A typical young early-apple orchard at Trenton, Tenn., in the Gulf Coastal Plains region. Note the cowpeas along the tree rows.

adapted to this region, and more than 90 per cent of the total acreage is of this variety. Figure 13 shows a berry field in this region.

Blackberries are grown for the general market at Greenfield, Tenn., and are considered profitable. The Early Harvest is the principal variety.

FIG. 12.—An 8-year-old orchard at Kevil, Ky., in the Gulf Coastal Plains region. The trees shown are of the Anderson variety, a summer apple.

SELECTION OF AN ORCHARD SITE.

Reference has been made to the necessity of a proper selection of good orchard locations and sites in the different regions of this area. In order that the grower in any region may judge as to his ad-

vantages or disadvantages, the principal factors which determine the desirability of a particular location and site in this area should be understood, and these are briefly considered here.

LOCATION.

The principal factors to be considered in the location of an orchard are labor supply, transportation facilities, markets, dates of ripening of fruits, and climate. An orchard may have the most favorable natural advantages for the growth of the trees and the development of the fruit, but because of lack of trained help at the harvesting season the fruit can not be properly handled, or because of impassable roads at a particular time of the year it is impossible to transport the fruit to railroads, or because iced refrigerator cars can not be secured when needed the fruit can not be shipped. The location of large peach orchards in some sections is not desirable because the

FIG. 13.—A strawberry field at Kenton, Tenn., in the Gulf Coastal Plains region. Note the vigorous foliage and lack of a mulch which are characteristic of strawberry fields in this region.

fruit ripens at the same time as in sections much nearer large markets which have lower freight rates. The same is true of the strawberry crop, which must compete with the product of the Atlantic Coast States and of the States farther west. Many locations having the above disadvantages may be found in this area.

The principal factors to be considered in the choice of a site for an orchard in this area are air drainage, contour, slopes, and soil.

AIR DRAINAGE.

A factor of much importance in the selection of an orchard site is air drainage. Cold air is heavier than warm air and settles to the lower levels. In late spring and early fall the temperature of the air is often cold enough at the lower levels to cause a frost, while higher on the hillside no frost occurs. In the spring, if warm weather has advanced vegetation sufficiently to start the trees into blossom, untimely frosts may kill the blossoms on trees in the valley

and on the lower parts of a hillside, while those on the higher elevations escape. The importance of the selection of an orchard site with good air drainage has been demonstrated in every part of this area. Figures 14 and 15 illustrate the effect of elevation in retarding the blossoming period. They also indicate how great an influence even a slight difference in elevation may have where atmospheric drainage is poor (*65*, *66*).

CONTOUR.

Another important factor in the selection of an orchard site, which has been disregarded to a large extent, is the contour of the field. Many of the ridges in the East Tennessee Valley region and in the Virginia Valley and Ridge region have hillsides where for several miles the slope is in the same direction and comparatively smooth. Orchards situated on ridges with such uniform contours may be cultivated and sprayed and the fruit harvested with much less ex-

FIG. 14.—An apple orchard of the Arkansas variety. In the hollow the blossoming has been delayed by the cooler air which settles there from the higher elevations. A slight difference in elevation has had a decided effect here on atmospheric drainage. Compare with Figure 15. Photographed at Gerrardstown, W. Va., April 6, 1910.

pense than where the contour is very broken. Figures 7, 8, 15, and 16 illustrate this difference.

SLOPE.

The steepness of the hillside on which the orchard is situated is also important. A gradual slope is to be preferred to a very steep slope, especially where there is danger of the soil washing. In much of this area the soil washes badly, and great care is necessary in its management. A site should be chosen where there is as little opportunity for washing as possible. Figure 17 shows an orchard on a steep hillside. Although the land has been terraced along the tree rows, gullies several feet deep have been made by heavy rains.

SOIL.

A good fruit soil should be fairly fertile and easy to work; it should contain large supplies of humus; it should have a fertile and

friable subsoil and should be well drained. Soils for orchards need to be deeper and have a more friable subsoil than for strawberries. Soils for the strawberry, however, must have a good moisture supply. Soils for peaches, in general, should be lighter than for apples. The reason for this is that the peach is even more susceptible than the apple to poor drainage, and the lighter types are usually better drained than the heavy soils. Furthermore, the varieties of fruit differ in their soil adaptation, some thriving better on the heavier types and others on the lighter types. For example, currants and gooseberries are best adapted to clay and other heavy soils. Peaches are grown mostly on the lighter soils. The Klondike strawberry succeeds on a wide range of soil types, while the Aroma does best on a heavy silt and the Gandy on a clay soil. In these regions, then, a soil adapted to the particular variety of the fruit to be grown should be selected.

Suitable soils for the desirable varieties of each fruit are found in nearly every section of these regions. In the Gulf Coastal Plains

FIG. 15.—The same orchard shown in Figure 14, but photographed one week later. Note that the trees in the hollow are in full bloom, while those on the higher elevations are past full bloom. Photographed at Gerrardstown, W. Va., April 13, 1910.

region the silt soils are the types of primary importance in fruit growing. In the Interior Low Plateau region the soils of limestone origin and in the Allegheny Plateau region the upland silt and clay soils and the soils of limestone origin are the most important types, while in the Virginia Valley and Ridge region in West Virginia, and in the East Tennessee Valley region, the limestone soils are best for fruits. In the East Tennessee Valley region and to some extent in other regions strawberries are grown on sandy soils, and certain varieties do well on such types. Peaches in the valley and ridge regions are grown also on soils derived from shales and do very well on red-shale (Penn sand loam) soil types.

Under the descriptions of the physical features of each pomological region references have been made to the publications giving information on the soils of the region. These should be studied in order to learn the variations in the soil types in each region and the methods of handling the particular soil type in order to get the best results.

DISEASE FACTORS.

In the descriptions of varieties of apples which are given later, the relative susceptibility of varieties to a number of diseases is often given a prominent place. This is done since the disease factor in a very large measure determines which varieties should be grown in this area. Certain diseases seem to be more virulent in the southern part of the area than in the northern part, and varieties affected by those diseases are much less desirable there than farther north.

Thus, the Ben Davis and other varieties belonging to the same group, such as the Gano and Shackleford, have proved very susceptible to the apple-blotch fungus and to the bitter and black rots in Tennessee, Kentucky, and along the river valleys at the lower altitudes in West Virginia. As a result, very few trees of this group have been planted recently in the southern part of this area, and the older plantings are rapidly being killed by body cankers and the San Jose scale. In like manner the York Imperial, which is the

FIG. 16.—A Grimes Golden apple orchard on Apple Pie Ridge at Gerrardstown, W. Va., in the Virginia Valley and Ridge region. Orchard operations on such a site are carried on with comparative ease. Compare with Figures 6, 7, and 8.

leading variety in the northeastern part of West Virginia, is of little value in Kentucky and Tennessee because of its susceptibility to "blight." On the other hand, the Winesap and other varieties belonging to its group, such as the Arkansas, Paragon, and Kinnard, are especially adapted to the southern part of this area because they are more resistant to "blight," apple blotch, and black-rot.

Spraying, of course, will control the apple blotch and black-rot, but the added cost of production makes it much more desirable to plant those varieties which have proved to be the most resistant to them. More than that, the cost of production, with added sprayings to control these serious diseases, will be so high that the fruit from such sections can not successfully compete in the general market with fruit from sections where the cost of spraying is less.

With the foregoing outline of the disease factor in mind, it will be seen readily that those parts of this area which are well adapted to general farming and where the land is relatively expensive will

not be likely to become extensive apple-orchard sections. On the other hand, in the hilly sections of the northern part of the area where the soil is fertile, the land is not usually adapted to a wide range of farm crops, and many sites especially adapted to orcharding may be found. Further, apple orcharding is a very specialized type of farming, and in a region where little fruit is grown it is often difficult to obtain trained help. In a developed orchard section trained help may be secured much more readily. The growing of apples in the southern part of this area, then, is not likely to become important on land adapted to general farming. On land not so well adapted to general farming where suitable locations and sites are found, varieties especially adapted to southern climates and somewhat resistant to prevalent diseases should be selected.

FIG. 17.—An apple orchard near the western boundary of the East Tennessee Valley region. Note the ridges along the tree rows made in an attempt to prevent the washing of the soil and the forming of gullies. Orchards on such steep hillsides are often kept in sod or only each alternate tree row cultivated.

THE VARIETY PROBLEM.

The adaptation of fruit varieties to different conditions and the response of different varieties to those different conditions are well illustrated in these regions. Many northern varieties are of no value in southern regions, while many southern varieties are of no value in northern regions. Some northern varieties ripen at the wrong season in the South to be profitable, while others are susceptible to diseases not found in the North. Some southern varieties do not mature in the shorter season of northern sections, while the trees of others are too tender.

The high elevations in West Virginia and eastern Tennessee offset to some extent at least the influence of latitude. On the higher hill and mountain sides in these States varieties adapted to regions much farther north are grown successfully, while varieties succeeding best at lower elevations are not so desirable.

A knowledge of the behavior of fruit varieties under the conditions in this area will be valuable not only to those interested in the fruit industry in this area but growers in other parts of the country will have a better knowledge of varieties in their orchards if they know how the same varieties act in other regions. Only through an accumulation of knowledge from a survey of many pomological regions can we hope to be able to state at all accurately the probable value of a variety in any particular section where it has not been tried.

Already the accumulation of knowledge concerning the adaptation and merits of varieties has been sufficient so that comparatively few of the varieties heretofore planted can now be advised for this area. Hundreds of fruit varieties not mentioned here have been tested by growers without the knowledge of what the results of former trials had shown. Such trials are expensive, and it is with the purpose of eliminating this useless duplication of effort that such surveys as this are made. By reference to Tables 6 to 9 a comparison of the number of varieties widely distributed in this area and those which can be recommended is readily made. It is to be expected that some listed for further testing will be discarded, while others may replace widely grown varieties.

Year by year the knowledge of the adaptation of varieties must be accumulated and tabulated. This work will of necessity never be finished, for progress, in part at least, must be in the origination and introduction of new and better sorts.

ORCHARD FRUITS.

APPLE VARIETIES.

The apple is the most important fruit in all the regions of this area, and recent extensive plantings indicate that it will remain so. The early plantings were made up of varieties that were brought in by the pioneer settlers from many sections of the United States. For this reason the list of varieties described in this bulletin is long, yet it consists of only a small proportion of the number studied. Many of the varieties described should not have a place in future plantings in any region of this area. Definite statements, therefore, regarding the value of each variety are made as far as possible, and of the most important varieties both faults and merits are mentioned. In Table 6, near the end of this bulletin, a summary is made of the more desirable varieties of apples for each region.

IMPORTANT VARIETIES OF APPLES STUDIED IN THIS AREA.

Akin.

The Akin originated in Illinois from seed produced in Tennessee (*63*, 1903, p. 268–269). It is not grown extensively in any part of this area, though it is found in many orchards in West Virginia and in some in Kentucky and Tennessee.

The tree is a vigorous, large, upright, open grower. Figure 18 shows a 10-year-old tree of this variety. It bears fairly early on chert soil, 6-year-old trees frequently producing a small crop. The fruit is of medium size, globose, and very smooth. The ground color is yellow, almost entirely covered with bright crimson as grown about Huntington, W. Va., but in the higher altitudes of that State it becomes striped and is less highly colored. The skin is tough and thick; the flesh is firm, very crisp, juicy, fine grained, and

good to very good in dessert quality. Its season in West Virginia is December to June.

It is liked by all who grow it because of its attractive color, long-keeping character, and high dessert quality. It may be of value for the fancy fruit trade.

Its faults are that it tends to send out extremely long branches, and the fruit is not always uniform in size, though usually so. Because it is of only medium size the yield in barrels does not equal that of the larger varieties, and in some places it is said to be late in coming into bearing. It is a promising winter variety for home use but hardly so for the general market in the Virginia Valley and Ridge region and in the Allegheny Plateau region of West Virginia.

Anderson. Synonyms: *Andersons Seedling, Paducah.*

The Anderson variety was originated by H. Anderson, of Kevil, Ky. Mr. Anderson planted seed of the Rome Beauty, Summer Pearmain, Ben Davis,

FIG. 18.—Akin apple tree, 10 years old, at Gerrardstown, W. Va.

and Winesap apples in his garden about 1890. Only two seeds of the Rome Beauty grew and one of these died later. Of the Summer Pearmain 1 seedling was saved, 2 of the Ben Davis, and 16 of the Winesap. Of the Winesap seedlings 7 bore sweet apples. None of the seedlings except the one of Rome Beauty proved to be worth saving, and this was named Anderson. It is grown by a few orchardists in the Gulf Coastal Plains region.

The original tree of this variety has borne regularly every year since it was 6 years old. In 1910 it bore 29½ bushels, in 1911 about 20 bushels, and in 1912 about 20 bushels. Figure 19 is from a photograph of this tree. Young trees of this variety on Mr. Anderson's place when 6 years old have averaged more than 1 bushel each and have continued to bear heavily each year since.

The tree is more vigorous and somewhat more upright than the Rome Beauty, but resembles it otherwise. Its foliage is slightly darker. The fruit is more oblate than the Rome Beauty and is handsomely striped with crimson

over a yellow ground color. In dessert quality it is good to very good, with a crisp, juicy, rather fine-grained flesh. Its season at Kevil, Ky., is the last of August and the first half of September.

The vigor and productiveness of the tree and the quality of its fruit make it a promising variety of its season for the Gulf Coastal Plains and the Interior Low Plateau regions of Kentucky.

Archibald.

The Archibald is an excellent sweet apple which originated at Alpha, Tenn., about 1872 (*70*), and it has been propagated to a slight extent.

The fruit is large, somewhat oblong, as dark crimson as the King David, and very attractive. The flesh is fine grained, juicy, and rich in flavor. Its season in northeastern Tennessee is July and August. For those who wish a sweet

FIG. 19.—Original tree of the Anderson apple, at Kevil, Ky. Photographed August 30, 1913.

apple, it seems deserving of wider recognition than it has received, because of its coloring and rich flavor.

Arkansas. Synonym: *Mammoth Black Twig.*

The Arkansas variety belongs to the Winesap group. It has been planted commercially in all regions of this area.

The tree is healthy, very vigorous, spreading, and an open grower, with very strong branches. Figure 20 shows a 6-year-old tree of the Paragon variety which was indistinguishable from Arkansas. The foliage is thrifty, dark green in color, and rarely, if ever, affected by cedar rust. The fruit is large, sometimes becomes very large, and is oblate in shape. It is usually well colored, sometimes almost entirely overspread with dull, deep crimson. The flesh is very firm and crisp. It is good in quality, and its season is late winter even when grown in southern Tennessee.

Because of the uniformly vigorous, healthy tree, the excellent keeping quality of its fruit, and its good flavor, it is well liked. It would probably become one

of the most extensively grown and profitable winter varieties in the area were it not for the fact that it is usually a shy bearer.

When experience has shown this variety to be productive in a locality, it may be planted commercially; otherwise it should be tested first. Though it has been found bearing regularly and heavily on many types of soils in all regions of this area, it also has been found rarely bearing good crops in nearly every section of each region.

Arkansas Black.

The Arkansas Black variety, also of the Winesap group, is frequently grown in orchards with the Arkansas.

The tree is moderately vigorous and spreading, though not as spreading as the Arkansas tree. The foliage is more susceptible to leaf-spot, and the fruit is more susceptible than the Arkansas to scab and blotch. The fruit is globose conic, large, but not so large as Arkansas, and is usually entirely covered with very dark purplish red. It keeps nearly as well as the Arkansas and is poorer in dessert quality.

FIG. 20.—Paragon apple tree bearing a crop of fruit when 6 years old, at Kevil, Ky., in the Gulf Coastal Plains region. Photographed August 30, 1913.

Babbitt.

The Babbitt variety is planted only occasionally in orchards of this area. It is not liked because of its poor keeping quality and its intense acidity; it should be discarded.

The tree is a vigorous upright grower. The fruit is of medium size, oblate in shape, and overspread with bright red. It resembles the Wagener both in shape and color. The flesh is crisp and juicy, but very acid. Its season in West Virginia is October and November.

Like the Arkansas, it is a shy bearer, and in many other respects does not equal it. The tree is not so desirable as that of the Arkansas and is somewhat less productive.

In but one orchard visited, located near Parkersburg, W. Va., was it considered a profitable variety. It can not be recommended for planting.

Bailey. Synonym: *Bailey Sweet.*

Only occasional trees of the Bailey variety have been observed scattered throughout the regions of this area.

The tree is a spreading, open grower, and subject to blight. The fruit is large, globose conic, and of a very attractive red color. Its dessert quality is very good for a sweet apple. Its season is the latter part of August in central Kentucky and mid-September in West Virginia.

Because it is subject to blight and because of its season it is not widely planted and can not be recommended.

Baldwin.

The Baldwin variety, which is one of the leading commercial sorts in northern apple regions, is frequently found in commercial orchards of both regions of northern West Virginia and occasionally in all other parts of the area.

The tree is a very vigorous, spreading, open grower, and bears in alternate years. The fruit is medium to large in size and usually well colored. It is frequently affected by the Baldwin spot. Its quality is good, and its season is September in Kentucky and October to January in the northern part of West Virginia. Except in West Virginia, it matures too early to be of much value. In northern West Virginia and at altitudes above 1,500 feet in all regions of the State it is productive, and the high-colored fruit keeps until early winter in cold storage. In all regions of this area, however, it is being replaced by varieties that have proved to be more profitable.

Banana.[10] Synonym: *Winter Banana.*

During the past few years several plantings of the Banana variety have come into bearing in West Virginia and Kentucky. All plantings, however, have been recent.

The tree is a vigorous, upright, open grower, and begins to bear when very young. About Henderson, Ky., it is an annual bearer, and in West Virginia it is one of the best bearers. Its foliage is very susceptible to cedar rust. The fruit is large in size, globose conic in shape, and the color is a clear yellow, frequently with a blush of bright red covering a considerable portion of the surface. The flesh is rather fine grained, crisp, and juicy. At its best it is highly aromatic and is very good in dessert quality, but ordinarily the period of maturity at which this highest quality is reached passes quickly, and it becomes poor to only good in quality. It is liked as a cooking apple. Its season in Kentucky is early September and in West Virginia October to December.

Its chief faults are (1) its susceptibility to cedar rust, ranking with Jonathan in this respect, being more susceptible than the York Imperial and Rome Beauty to this disease; (2) it does not retain its best dessert quality long nor keep very well. In Kentucky the fruit is somewhat susceptible to blotch.

For its season it is considered desirable in the northern part of the Allegheny Plateau region and in the Virginia Valley and Ridge region, as the tree bears when very young and the fruit is large, attractive in color, and very good in dessert quality. Unless one becomes skilled in marketing this variety it is not satisfactory, and it is doubtful whether it will long remain a prominent variety in this area.

Beach. Synonym: *Apple of Commerce.*

The Beach variety, which was formerly planted extensively in all parts of this area, is being planted but little at the present time. Many of the older trees are being grafted to more desirable sorts.

The tree is not a large grower and is subject to blight, but is spreading, open, and usually productive. The foliage is subject to leaf-spot. The fruit is small, oblate, with attractive red coloring, covered with a heavy bloom, and is subject to bitter-rot. Its dessert quality is poor, and its season is usually early winter, though sometimes it keeps well. It is not liked because of its poor quality and small size and because the tree is subject to disease. It should not be planted.

Ben Davis.

The Ben Davis variety is supposed to have originated either in Tennessee or Kentucky. In former times it was a leading variety in all regions of this area. Published reports frequently state that the Ben Davis is at its best and name it as the most successful, or one of the most successful, varieties in the States of this area. On the contrary, its behavior in recent years has been very unsatisfactory. It is now being little planted, and the older plantings are passing out of existence. Hundreds of acres of this variety have been abandoned, and because of the poor dessert quality of the fruit many growers have been unable to market their crops.

The tree does not grow to a large size and is not generally long lived. It usually bears well, though not so well as the Winesap in Kentucky and Tennessee and not better than the Rome Beauty in the Allegheny Plateau

[10] For a complete history and description of this variety, see Taylor and Gould (*64*, p. 110).

region or the York Imperial in the Virginia Valley and Ridge region. Figure 21 shows an orchard of this variety at the time of blossoming. It is somewhat subject to twig and blossom blight, and its foliage is subject to leaf-spot.

The fruit is usually well colored at maturity in all parts of this area, becoming highly colored at the higher altitudes on poor soils in West Virginia. It is always poor to fair in dessert quality, but is among the best cooking apples when well grown. It is sometimes picked in August in the Gulf Coastal Plains and the Interior Low Plateau regions of Tennessee and Kentucky to be shipped as a cooking apple, in order to prevent the loss of the crop from apple blotch and the black and bitter rots, to which it is very subject.

Because the Ben Davis tree is especially subject to San Jose scale, to the Illinois or blister canker, and its foliage to leaf-spot, while the fruit is among the most susceptible to the apple-blotch fungus, sooty fungus, and to black and bitter rots, it should not be planted in any region of Tennessee or Kentucky.

In West Virginia it is less subject to the diseases enumerated above, though at the lower altitudes in river valleys it is frequently subject to severe attacks

FIG. 21.—Orchard of Ben Davis apples in bloom at Gerrardstown, W. Va., in the Virginia Valley and Ridge region.

of apple blotch. In northern West Virginia and at the higher elevations in other parts of that State, orchards sprayed in the usual manner are regular bearers of clean fruit, and it is classed as one of the profitable varieties. However, it is being planted very little in any region of this State at present, as other varieties of better dessert quality are found to be more desirable.

Benoni.

The Benoni is grown slightly in Kentucky and West Virginia. The tree is an upright, dense grower, usually productive, tending to bear in alternate years. The leaves are very subject to cedar rust. The fruit is generally small, for the tree tends to overbear when a crop sets. As a rule the fruit is well colored with bright-red stripes and ripens just after Early Harvest. In the Gulf Coastal Plains region of Tennessee it ripens during the first half of July.

Commercially it is not considered the equal of other varieties of the same season that are more commonly grown. In various places in Kentucky and West Virginia it bears well, but is reported as undesirable for market because of the small size of the fruit. It is desirable, however, for home use because of its high dessert quality.

Berry Red.

The Berry Red apple, reported to have originated near Kingston, Ky., is grown to some extent in the hills and mountains of the Allegheny Plateau region in that State and slightly in the surrounding regions.

In the Allegheny Plateau region of Kentucky the tree is reported as productive and in the East Tennessee Valley region as unproductive and late in coming into bearing. The fruit is of only fair dessert quality, and its season is early winter. It is without sufficient merit to be worthy of further propagation.

Bible. Synonym: *Joe Bible.*

The Bible apple is a local variety in the northern part of the East Tennessee Valley region and originated on the place of the late Joseph Bible, 1 mile west of Warrensburg, Tenn. This curious variety has bluish flowers. The tree is reported as productive, bearing very dark red fruits of good dessert quality which ripen through a long season. In the northern part of the East Tennessee Valley region its season extends from about August 10 to September 15. The foliage of the tree resembles that of the Oldenburg; the tree itself is somewhat subject to blight.

Until tested in regions outside that of its origin its adaptation can not be determined, but its long season of ripening will probably limit it to home orchards.

Bietigheimer.

The Bietigheimer variety was observed only in northern West Virginia. Though grown but little there, it is considered more desirable than the Wolf River, with which it compares in size.

The tree makes a rather small growth in West Virginia, but is open and productive. The fruit is very large, very highly colored with attractive red, of only fair dessert quality, but it is somewhat better in dessert quality than the Wolf River. Its season in northern West Virginia is early to mid-September. Because it does not keep well and is too large for a good commercial variety, it is not desirable.

Black. Synonym: *Black Jersey.*

The Black apple, seen only in West Virginia, has been grown chiefly because of its handsome dark-red color.

The tree is spreading and open in growth and is fairly productive. The fruit is small to medium in size, frequently lipped at the stem. Its color is a very attractive deep red, almost black, and it is only fair to good in dessert quality. Its season is midwinter.

In commercial characteristics it is surpassed by many other varieties and is not recommended.

Black Ben. See Gano.

Broadwell. Synonym: *Honey Sweet.*

The Broadwell sweet variety was seen at Sinks Grove, W. Va.; it is very little grown. It is a rather large conic apple, of a very attractive yellow color with a red blush, and of very good dessert quality. It ripens in October and November with the Rhode Island Greening. It is liked by those who are familiar with it, and is considered one of the best autumn sweet apples.

Cannon Pearmain.

Though grown in but few orchards in West Virginia, the Cannon Pearmain variety is well liked.

The tree is spreading, with tough branches. The fruit is medium to large in size and is usually almost entirely striped and mottled with red and has conspicuous dots. It is good in dessert quality and retains its flavor well in storage. In common storage it is reported to keep well till June. On both poor and fertile soils in north-central and northeastern West Virginia the tree has proved to be very long lived, vigorous, and one of the most regular bearers of all. In Virginia (*18*), however, it has been found to be as sensitive to the influence of conditions as the Yellow Newtown and to require much the same conditions for its highest development as that variety. It should be more generally tested as a long-keeping winter apple.

Celestia.

The Celestia variety is planted but little at present; it was seen in West Virginia.

The tree is spreading with drooping branches and bears well. The fruit is large, globose conic in shape, and yellow in color. The flesh is crisp, firm, and good to very good in dessert quality. Its season is just before Grimes Golden.

and it keeps fairly well. It deserves to be tested further by fruit growers of West Virginia. Where seen it ranked close to Grimes Golden in desirable qualities. In Ohio the tree is reported as late in coming into bearing and that the fruit is easily bruised.

Champlain.

The Champlain apple has proved to be a profitable variety in Hardin County, Ky., where it ripens about July 10 to 15, soon after the Yellow Transparent.

The tree is large, upright, and productive. The fruit is medium to large in size and a beautiful yellow in color. The flesh is tender, juicy, and very good in dessert quality. Its season is early to mid-July; it has been one of the most regular bearers and one of the most desirable of its season in Hardin County, Ky. Although it is easily bruised and must be handled with extra care, it is worthy of testing in the Interior Low Plateau region of Kentucky.

Chenango.

The Chenango variety is grown to some extent throughout all the regions in this area.

The tree bears well. The fruit is medium sized, oblong conic in shape, and colored with very attractive red stripes. The flesh is tender and juicy and good to very good in dessert quality. Its season is early summer. The fruit is too tender to make it a desirable commercial variety and it ripens through a long season. It is, however, one of the best of its season for home use.

Chicago.

The Chicago apple is grown to some extent in all parts of the area.

The tree is a very open, spreading grower. In West Virginia on poor soils it has so far proved unproductive, though the trees have been healthy, and the fruit produced is attractive in color, as high in dessert quality as the Delicious, and superior to that variety in keeping qualities. In the East Tennessee Valley region on rich soil it was observed to be bearing well. The fruit is medium to large in size, oblate, and usually entirely covered with a dark attractive red. The flesh is firm, juicy, and almost sweet in flavor. Its season in the East Tennessee Valley region is late fall and in the Virginia Valley and Ridge region of West Virginia, October to March. It deserves to be tested further because of its high dessert quality and attractive color.

Claibourne. Synonyms: *Benham, Brown, Nat Ewing.*

The Claibourne variety was found on the Lock farm in an Indian village in Lee County, Va., and has been distributed to some extent in the surrounding country (*70*).

In a letter dated November 25, 1915, T. G. Fulkerson, of Claiborne County, Tenn., says: "I first heard the name Benham 15 or 18 years back and suppose the Benhams that live 20 or 25 miles east, in Lee County, got the apples in some way and the nurseryman Hale got the grafts and named it."

The tree is upright, resembling that of the Horse. The fruit is large, of a clear yellow, sometimes with a bronzing on the side, subacid, fine-grained, and very good in quality. In the northern part of the East Tennessee Valley region apples in good condition were picked from a tree of this variety on August 19 and other specimens were still green, while the first apples were reported to have ripened about June 25.

It is a desirable variety for home orchards in that region because of its long ripening season and its good dessert quality.

Coffman.

The Coffman variety, which originated at Curve, Tenn., on the place of W. L. Coffman (*63*, 1909, p. 377), is grown to a slight extent in the Gulf Coastal Plains region. The farm on which the variety originated was bought by Mr. Coffman in 1883 from the widow of a Mr. Keltner. At that time there were six or eight old apple trees growing on the site where an orchard of about 2 acres formerly stood. In it grew three or four trees of the Coffman apple, only one tree of which was living at the time Mr. Coffman purchased the place. This one tree was partially decayed at that time and died about 1900. There are at present no trees of this variety in the vicinity. Mr. Coffman's son states that the apples ripened through a period of seven weeks, a habit somewhat characteristic of the Red June, of which it is supposed to be a seedling.

In an article in the Yearbook of the Department of Agriculture for 1909 the tree is described as a vigorous and upright grower and regularly pro-

ductive; the fruit as oblong to oblong conic, medium to large in size, with a pale-yellow ground color washed over practically the entire surface with mixed red striped with dark purplish red; the flesh as rather fine grained, juicy, sprightly subacid in flavor, and its dessert quality good to very good. Its season is the last of June and the first part of July in the Gulf Coastal Plains region in Tennessee.

Where an apple of the Red June type is wanted this variety should prove more desirable than Red June because of its larger size and better carrying quality.

Collins. Synonym: *Champion.*

Throughout all the regions of the area the Collins variety is found in commercial orchards.

The tree is similar to that of the Ben Davis and is an annual bearer in northern Alabama, Tennessee, and Kentucky. The fruit, like that of the Ben Davis, is very subject to apple-blotch fungus, black-rot, and bitter-rot in Tennessee and Kentucky. The fruit is small to medium in size, oblate, usually very attractive red in color, and poor in dessert quality. It keeps well into the winter in southern Tennessee and is a late winter apple farther north.

Were the fruit of higher quality, this variety would doubtless prove of value because of its productiveness, good keeping quality, and high color. The Winesap is, however, its equal or superior in all these respects in this area and should be grown in its stead. In West Virginia the Collins is not a sure bearer, is not well colored, and is surpassed by many other varieties.

Deacon Jones.

The Deacon Jones apple, resembling the Black Gilliflower in fruit, is found in a few orchards of northern West Virginia.

The tree is vigorous, upright spreading, rather open with drooping, slender branches, and productive. The fruit is large, uniform oblong conic in shape, usually entirely covered with an attractive deep-red color. Its season is early winter in northern West Virginia.

The dessert quality of this variety is too poor and its flesh too coarse to make it desirable in this area, although in New York State it is considered worthy of trial as a general purpose market apple (*24*, p. 180).

Delicious.

During the past few years the Delicious variety has been planted in all parts of this area, as well as throughout most other parts of the country. Most of the plantings have been small, though it forms a part of many large commercial orchards. Few of these orchards are in full bearing as yet. However, a sufficient number of bearing trees distributed throughout this area have been seen to note its behavior on young trees.

The tree has been uniformly one of the best and is superior to that of most varieties on almost every type of orchard soil. It is vigorous, uniformly healthy, and upright, spreading in growth with strong branches. On the poorer types of soil it is an early bearer, and in Kentucky and Tennessee an annual bearer. On some strong clay soils in West Virginia it frequently does not come into bearing until 8 or 9 years old. On the poorer soils, however, and on some of the richer soils it bears at an earlier age, good crops being borne on 7-year-old trees. It is one of the most resistant to blight, and the foliage is very resistant to apple rust.

The fruit is large and not very subject to apple blotch, black-rot, or bitter-rot. Its color is a handsome red over nearly the whole surface. The flesh is fine grained, juicy, very mild subacid, and its dessert quality is very good. In southern Tennessee it ripens during the last of August and the first part of September. If placed promptly in cold storage it will keep throughout the fall. In the regions farther north, in the East Tennessee Valley region, and in central and eastern Kentucky it is picked the latter part of September, and its season lasts through October without cold storage and longer with cold storage. In West Virginia it is usually picked during the latter part of September and may be held in cold storage till Christmas or a little later.

The chief faults of the Delicious in this area are that it is distinctly a dessert apple, not a cooking variety, and that in common storage it loses its high dessert quality rather quickly. It also lacks the acid of many of the best dessert apples. Because of its early bearing, productiveness, and the high quality of its fruit it will be an important variety in all regions. It is probable, however, that it is not adapted to altitudes much exceeding 3,000 feet in this area, for in southwestern Virginia at 3,300 feet it does not always mature

properly, retaining an unripe flavor, as sometimes happens in northern New England.

Domine.

The Domine is an old variety widely distributed in this area but grown only in home or small commercial orchards.

The tree is very characteristic, having a spreading growth, very small number of branches, but thick main branches with many short fruit spurs on them. It is not a regular bearer. The foliage is also very characteristic, suggesting that of the peach. The fruit is medium in size, oblate, usually poorly colored, and subject to apple scab. Its dessert quality is good to very good, and its season early winter, except in the southern portion of the area where it is a fall apple.

It is not being further planted, as the tree is somewhat subject to blight, is a poor orchard tree, and the fruit is too poorly colored and is not uniform in size.

Eades. Synonym: *Polly Eades.*

The Eades variety originated near the town of Robards, Ky. It was found by W. A. Sandefur, a nurseryman in Henderson County, about 1884, growing on a farm from the owner of which it derives its name. Mr. Sandefur began propagating it immediately, and it is now grown to some extent in the orchard section of Henderson County.

The tree grows to large size and is healthy. The fruit is of desirable size, yellow, and mild subacid. It ripens about August 1 at Robards, and ships well. For its season and color it is a desirable variety.

Early Harvest. Synonym: *Gold Drop.*

In the early apple orchards of Tennessee and Kentucky the Early Harvest variety is almost always found, but it is not always satisfactory.

The tree is spreading and grows to medium size. In some orchards it has been attacked so badly by a canker which affects the trees at the crotches of the branches that it is nearly worthless. In certain orchards the aerial form of crown-gall becomes serious. Sometimes it bears well in alternate years and the crop is so large that the fruit is small. The fruit is usually of medium size or below in this area and is clear yellow in color. It is good in dessert quality and ripens about with the Yellow Transparent. The fruit ripens quickly and may be gathered in one or two pickings, while several pickings may be needed to harvest other summer varieties properly.

As the Early Ripe seems healthier and bears larger fruit, it should be used in most cases in place of the Early Harvest. For the home orchard where the canker is not serious the Early Harvest will be found much more satisfactory than Early Ripe, as it is better in dessert quality.

Early Ripe.

During recent years, since the early apple orchards have become more prominent in Tennessee, a large number of early-ripening varieties have been tested. Among these the merits of the Early Ripe have made it more and more prominent.

The tree is healthy, spreading, and an early and regular bearer. The fruit is of medium size, very uniform in size and shape, not as easily bruised as many of the early varieties, yellowish green in color, good in dessert quality, though not as good as Early Harvest, and ripens about a week later than the Yellow Transparent.

Though slightly later than the Early Harvest, the Early Ripe is frequently more desirable because of its larger size, more uniform shape, and better shipping quality.

Ensee.

The Ensee apple, supposed to be a seedling of the Rome Beauty, originated in Lawrence County, Ohio, just across the river from Huntington, W. Va. (*63*, 1907, p. 307).

The tree is subject to attacks of the aerial form of crown-gall, is an upright grower, resembling the Rome Beauty, and seems to bear slightly younger than that variety. Its foliage is subject to cedar rust. The fruit is very large in size, globose to globose oblate, yellow in color, covered with attractive red stripes. Its dessert quality is very good. In the northern part of the East Tennessee Valley region its season is August and September and at Huntington, W. Va., from October to March. In cold storage it is reported as a better keeper than Rome Beauty. It has been grown to a slight extent in this area, but has not yet been sufficiently tested to have its value determined.

In the East Tennessee Valley region it is not considered equal to other varieties of its season that are commonly grown.

Ewalt.

The Ewalt apple, an old northern variety, is found in a few of the orchards of northern West Virginia.

The tree is long lived, spreading in habit of growth, and productive. The fruit is above medium size, yellow, heavily blushed with red, and is somewhat susceptible to apple blotch. It will keep well into the winter. Though suitable for culinary use, it is too acid for dessert purposes, is rather poor in quality, and is not considered desirable.

Fallawater. Synonyms: *Waldar, Tulpehocken, Pound.*

The Fallawater variety is found throughout the area, but especially in the older orchards of Kentucky and West Virginia. It was formerly a great favorite because of its very large size and usual productiveness, but has been planted very little recently.

The tree is vigorous and spreading, but often short lived. The fruit is very large, globose, and drops badly before ripening. In Kentucky the fruit is a dull green in color and has very little or no bluish or bronzing. In West Virginia, however, the green is a somewhat brighter shade and frequently half of the surface is covered with a bronze blush. Its flesh is coarse grained, very mild subacid, becoming almost sweet at times, and is rather poor in dessert quality as it lacks flavor. It is not considered desirable for cooking, but is usually marketed during the holiday season as an eating apple. In Kentucky it must be placed in cold storage to keep till the holidays, but in northern West Virginia it may keep this length of time in common storage.

Because of its unattractive color and poor quality, it should be discarded.

Fall Beauty. Synonym: *Pipers Fall Beauty* (*16*).

This variety originated at Clinton, Ky., on the place of R. H. Emerson and was first propagated about 30 years ago. It is found at present in several orchards in the Gulf Coastal Plains region of Kentucky.

The tree is somewhat, though not seriously, subject to blight, upright, becoming spreading after coming into bearing. It does not begin to bear much until 9 or 10 years of age, resembling the Rome Beauty in this as in many other tree characteristics. The foliage is susceptible to cedar rust.

The fruit is large in size, slightly oblate in form, and somewhat subject to apple blotch. The ground color is yellow, striped and splashed with deep red and crimson, making it very attractive. The flesh is moderately fine to coarse grained, varying in this respect. It is sprightly subacid and good to above good in dessert quality. Its season is the last of August and through September at Clinton, Ky.

It is recommended for further testing as a good dessert variety for its season, especially in the Gulf Coastal Plains region and the Inland Low Plateau region.

Fall Pippin.

The Fall Pippin is grown to a limited extent in West Virginia and is liked because of its high quality as a dessert and cooking apple. The tree is somewhat subject to blight, and the fruit drops badly. It ripens during September and October. For these reasons it does not seem destined to be grown except for home use. For those who wish an apple of its season of high dessert quality for home use this variety will commend itself.

Fall Wine.

The Fall Wine is found in many of the older home orchards of West Virginia, where it is grown because of its attractive color and high dessert quality. The tree is healthy, spreading, and usually productive. The fruit is of only medium size, very attractive in color, and has high dessert quality. It does not keep well and is too tender for shipping. Its season is September in West Virginia. Because of its productiveness and the color and quality of the fruit, it is desirable for home use.

Fameuse. Synonym: *Snow.*

The Fameuse, which is a well-known variety in northern apple districts, is found in many of the older orchards of West Virginia.

In this area the tree is one of the most healthy and longest lived of all varieties. It seems to be very deep rooted and makes a vigorous dense growth. The fruit is usually medium to above medium in size, though sometimes it bears so full that the fruit approaches the small size common to it in the North. It is also longer and more cylindrical in shape than when grown farther north. In dessert quality it ranks good to very good and is

liked for home use. Its season is September in West Virginia. Although as it grows in this State it is uniformly larger and usually more highly colored than in the North, it lacks the aroma and often the tender flesh which makes it prized in northern regions.

Another fault which makes it undesirable for commercial orchards is its habit of dropping its fruit prematurely, so that sometimes only a very small part of the crop is picked.

Fanny.

In the early-apple orchards of Tennessee and to a less extent in Kentucky the Fanny has become very popular and is now the leading variety for its season.

In the Interior Low Plateau region of Tennessee the tree is reported as one of the most resistant to woolly aphis. It is an open spreading grower and begins to bear at an early age. In one commercial orchard in the Gulf Coastal Plains region of Tennessee 7-year-old trees averaged more than 1 bushel per tree and have borne regularly since. The foliage is susceptible to apple scab and cedar rust. The fruit is medium in size and quite uniform. It is firm and therefore suitable for shipping to northern markets. The ground color is yellow, overlaid with bright red, and it is very good in dessert quality. It begins to ripen in the Gulf Coastal Plains and Interior Low Plateau regions of Tennessee about July 10, and the whole crop may be picked within a week.

Its high color, high dessert quality, and its annual and early bearing habit make it a popular commercial variety for its season. Its weak points are that the tree is somewhat subject to blight, its blossoms are injured more often than many other varieties by frost because it blooms very early, and the fruit drops rather early, especially if the season is windy.

Flora.

The Flora is frequently found in the older home and commercial orchards in West Virginia and Kentucky, but has not been recently planted.

It has a spreading tree with a dense growth of foliage and is usually unproductive. The fruit is medium to large in size, smooth, round conic in shape, and is one of the most uniform in size and shape of all varieties. It is a clear yellow in color, sharply acid without distinctive flavor, and is rather poor in dessert quality. Its season is fall and early winter, ripening in the Interior Low Plateau and Allegheny Plateau regions of Kentucky during the last of September and in West Virginia during October, November, and December. It is so poor in dessert quality and the tree is so unproductive that it should be discarded.

Gano and Black Ben.

The two varieties, Gano and Black Ben, may have had a separate origin, but are so nearly identical as grown commercially that they have been propagated by some nurserymen as the same variety in recent years. They have been extensively planted throughout the area and have been among the leading varieties.

The tree and foliage resemble the Ben Davis closely and are subject to the same diseases. The fruit also is subject to the same diseases as the Ben Davis and to a similar extent, but is usually very much higher colored, becoming almost solid red. Sometimes, however, at high altitudes in West Virginia, the fruit is a dull red, lacking the brilliant color for which it is usually known.

By many growers the Ben Davis is preferred, as the fruit does not drop so badly and may be picked later than the Gano or Black Ben. Recently these varieties have been planted more than the Ben Davis, but to meet the same market demands. Neither variety should be planted in any part of Tennessee or Kentucky, while in West Virginia the Rome Beauty, York Imperial, Stayman Winesap, and other varieties will usually prove more profitable.

Gravenstein.

The Gravenstein variety is occasionally found in all regions of this area, but is not often grown on a commercial scale.

The tree is spreading, with somewhat drooping branches, and is long lived. It is sometimes reported as only moderately productive. The fruit is usually above medium size, though when the tree is very full it becomes small. It is handsomely striped with bright red and is very good in dessert quality. It ripens very nearly with the Oldenburg and usually lasts much longer. At Stanton, Tenn., when the first Oldenburgs were picked on June 24 and the last

on July 3, the first Gravensteins were picked on June 25 and the last on July 5. Its season at this point was shorter than is usually the case.

Though considered a northern variety, the Gravenstein seems worthy of wider trial in early-apple orchards of this area. Its excellent dessert and cooking qualities make it preferable in some ways to the Oldenburg, which is too acid for dessert. In West Virginia it ripens through too long a period to be a first-class commercial variety.

Grimes Golden.

The original tree of the well-known dessert apple, Grimes Golden, grew on a farm located about 3 miles east of Wellsburg, W. Va., owned at the time this apple came into notice by Thomas Grimes. This tree died more than 10 years ago and was supposed to have been over 100 years old at the time of death. In all parts of the area it is one of the desirable varieties of its season.

The tree makes a vigorous growth and requires comparatively little pruning. Though it is affected by blight, it is less subject to this disease than many varieties and is not often seriously injured by it. The greatest fault of the variety is its susceptibility to injury at the crown of the tree by the disease correctly called collar blight but which is commonly known as collar rot.[11] In Tennessee and Kentucky it is known as an annual bearer and in West Virginia as a productive bearer. Though usually a moderately early bearer, it sometimes does not produce heavily before it is 10 or 12 years of age. The foliage is rarely affected by diseases. The fruit is not subject to apple blotch and is usually very smooth. Its dessert quality is very good to best except in the southernmost part of this area, where it loses part of its aroma, yet still ranks as good. In the Gulf Coastal Plains region of Tennessee it is picked the latter part of August. In central Kentucky it is picked about the middle of September, but is a late fall apple in eastern and northern Kentucky. In West Virginia, where it forms one of the leading varieties in the commercial orchards, it is usually marketed before January 1. It is subject to scald in storage. In all regions this variety is one of the best for home use and market. (Fig. 22.)

FIG. 22.—A young apple tree of the Grimes Golden variety, at Keyser, W. Va. Grimes Golden is subject to blight at the surface of the ground. This tree was grafted at about a foot in height to furnish a resistant trunk, and the stock has outgrown the top.

Grosh. Synonym: *Ohio Beauty.*

This variety was seen at Fayetteville, Tenn., where it is grown in some of the commercial orchards.

The tree is vigorous, upright, comparatively free from disease, productive, and an early bearer. Eight-year-old trees bore a full crop of large fine fruit of excellent quality. The fruit is very large, nearly globose, and clear yellow in

[11] In this area this trouble is not so serious as it is sometimes reported and is not much worse than on many other varieties. See Giddings (*17*), Green and others (*21*, p. 91), and Waite (*67*).

color with a bright-red blush. It is very good in dessert quality and ripens during the latter part of July and the first part of August in southern Tennessee. It appears to be a promising variety for its season in that section.

Halfberry. Synonym: *Bastard Berry.*

The Halfberry variety originated at Flat Lick, Ky., as a seedling of the Berry Red. It has a local distribution in the orchards about that place.

The tree is very productive, but the foliage is subject to leaf-spot and cedar rust. Its dessert quality is good, somewhat better than Ben Davis, but too poor to make it desirable. Its season is late fall and early winter.

Horse.

In most regions of Tennessee the Horse apple is one of the standard summer varieties for the home orchard. It is also grown to some extent in Kentucky and is found in many commercial orchards.

The tree is very vigorous, an upright dense grower, very subject to blight, not usually a heavy bearer, but produces a good crop each year. Its foliage is subject to cedar rust. The flesh is crisp, juicy, and brisk subacid, making it desirable for both cooking and eating fresh. Its season is August in northern Tennessee and central Kentucky. Because it is so subject to blight it is not recommended for general planting, though it has some value in the home orchard.

Hubbardston.

The only commercial orchard visited in which the Hubbardston variety was found to form a prominent part was in the northern Panhandle of West Virginia, at which place the trees were productive, the fruit uniformly of good size, high in dessert quality, and ripening in early winter. Though distributed to a slight extent in the orchards of other parts of West Virginia and in Kentucky, it is not as desirable as many other varieties of its season.

The tree is an open spreading grower, vigorous, and usually healthy, although sometimes in Kentucky the tree seems weak. It begins to bear at an early age and bears well. The fruit is sometimes very highly colored in this area, but is not usually very attractive in appearance. It is large in size and of very good dessert quality in the northern Panhandle of West Virginia, but lacks some of this quality in sections farther south.

Hyde King.

The Hyde King is found in several of the commercial orchards of northern West Virginia.

It is an upright spreading grower, usually open, and forming a vase-shaped tree. The fruit is large, globose, uniform in size, and of a clear yellow color with a bright-red blush on the exposed side. Its dessert quality is not above good, as it has a coarse flesh with no distinctive flavor. Its season is midwinter.

The future of this variety is doubtful. It has many good qualities and the trees are usually productive, but it seems to be too poor in quality to compete with Stayman Winesap and other varieties of its season.

Ingram.

The Ingram (*62*, p. 382) variety originated in the Ozark region, where it is grown quite extensively and is liked for its good dessert and long-keeping qualities, the productiveness of the tree, and its late-blossoming habit.

In this area it has been tried in Kentucky and to a less extent in West Virginia and Tennessee. In Tennessee the tree is affected by blight as badly as the Ralls, of which it is a seedling; the fruit is susceptible to bitter-rot, and the foliage to the leaf-spot fungus. It bears well and is liked fairly well in spite of diseases. In Kentucky the tree is affected by blight somewhat less than in Tennessee, though the fruit is very subject to bitter-rot and somewhat subject to blotch. It bears regularly and keeps very well in cold storage. The fruit is well colored, but rather small. In West Virginia it bears in alternate years and is not generally desirable.

Because the Winesap is the equal, or superior, of this variety in most respects it should probably be grown instead of the Ingram in all this area except in West Virginia, where the Stayman Winesap is grown. In the Cumberland Plateau region Ingram may have some value in escaping frost, for it blossoms late.

Jefferis.

The merits of the Jefferis apple consist for the most part in its excellent dessert quality and the attractive red color of its fruit. Its long season of ripening bars it from commercial orchards, but recommends it to the home

orchard where but few trees can be planted. In the Gulf Coastal Plain region of Tennessee it begins to ripen about the middle of July and in West Virginia and the northern part of the East Tennessee Valley region in early August.

For the home orchard this variety is regarded as desirable in all the regions of this area.

Jonathan. Synonym: *Saxon.*

The Jonathan has been planted extensively during recent years in all parts of this area. It has some bad faults, but more excellent qualities.

The tree is subject to blight, sometimes quite seriously so. As with all varieties, the blight is less severe in West Virginia than in Kentucky and Tennessee. Its foliage is more susceptible to cedar rust than that of the York Imperial or Rome Beauty, and where cedar trees abound this disease is sometimes serious. The fruit is subject to the "Jonathan spot," which develops on the surface of the fruit after picking, making it unattractive in market.

On the other hand, the tree is one of the earliest to bear, being better in this respect than the Stayman Winesap, York Imperial, Rome Beauty, Winesap, and many others. It is fully equal to the Ben Davis and Gano in this early-bearing quality. (Fig. 23.) The trees are vigorous, rather open and spreading in shape, and long lived. It is one of the most productive varieties, old trees of it in northern West Virginia being said to surpass all other varieties in this respect. The fruit is medium to large in size, uniform in shape, and very highly colored with bright red. Its dessert quality is very good to best in this area. Its season in Tennessee is September. In Kentucky it may be kept for the fall trade. In West Virginia, though usually picked before October 1, it may be kept in cold storage till Christmas or later.

FIG. 23.—An Orchard of Jonathan apples at Tennessee Ridge, Tenn., in the Interior Low Plateau region. These trees bore a good crop in 1913 when photographed. They were then 8 years old.

The merits of this variety are probably sufficient to place it as one of the leading varieties for its season throughout all regions of this area. (Fig. 24.)

Kaighn.

The Kaighn is found in a few commercial orchards of northern West Virginia. The tree is somewhat subject to blight, is very upright in habit of growth, becoming spreading and open after coming into bearing. It is reported as relatively unproductive. The fruit is large, shaped much like the Black Gilliflower, deep red in color, uniform and smooth, and of good dessert quality. Its season in northern West Virginia extends till Christmas. It is not considered a promising variety in this area.

King David.

The King David has been planted in recent years in most parts of this area. Like the Jonathan, it has serious faults and many excellent qualities. Its faults seem at present to be more serious than those of the Jonathan. Chief among them is the poor keeping quality of the fruit as it is commonly handled. Several orchardists have reported that the flesh turns brown at the core and that this browning spreads toward the surface in cold storage. Earlier picking than usual has helped in some cases to overcome this trouble. When kept for any considerable length of time it is inclined to wilt, as a result of too much evaporation of moisture from the skin. As ordinarily kept in common storage it soon loses its crispness, becoming mealy and somewhat dry. In northern Alabama it is subject to a spotting of the skin which hinders its sale in the market.

The tree is one of the earliest varieties to come into bearing. Orchards were visited where it bore some fruit when 3 or 4 years old and had continued

to bear regularly thereafter. It makes a strong, spreading, open growth and is not very susceptible to blight, nor the leaves to cedar rust. The fruit is of medium size and very uniform. It is very dark red, sometimes becoming purplish red in color, and is very attractive. It is brisk subacid, sometimes acid in flavor and is not mild enough to be eaten out of hand until it begins to soften. It is a very good cooking apple and one of the best for jelly. It is very aromatic and at its best is good to very good in quality. It ripens at about the same season as the Jonathan, but should probably be picked first.

Its place in the orchards of this area has yet to be determined. It will depend in a large measure upon whether it can be picked at such a period of maturity that it will keep well in storage. In New York State it is recommended as one of the most promising new apples (*25*, p. 306).

Kinnard. Synonyms: *Kinnard's Choice, Black Twig.*

The Kinnard apple (*63*, 1910, p. 427) originated at Franklin, Tenn., on the farm of Michael Kinnard and belongs to the Winesap group. Trees and small orchards of this variety are widely distributed throughout this area, but in no case are there large plantings. It seems to have no very bad characteristics and many good ones.

The tree is slightly more susceptible to blight than the Winesap. The fruit is very subject to apple scab and sometimes to bitter-rot and apple blotch. In orchards that are well cared for, however, none of these diseases have been very serious. On the other hand, the tree bears when quite young, is vigorous with very strong branches that become very drooping with age, and seems to average fully as productive as the Winesap. In Tennessee, Kentucky, and northern Alabama the fruit is as large as the Winesap, or larger, while in West Virginia it is much larger. It is covered with a deep red that is not quite so attractive as that of the Winesap. It is very good in dessert quality, except in West Virginia, where it ranks as good. To some its peculiar vinous flavor is objectionable. In Tennessee it is picked about the middle of September. In central Kentucky it keeps well into the winter, though it loses some of its flavor after about January 1. In West Virginia it is distinctly a winter apple and hangs on the trees well.

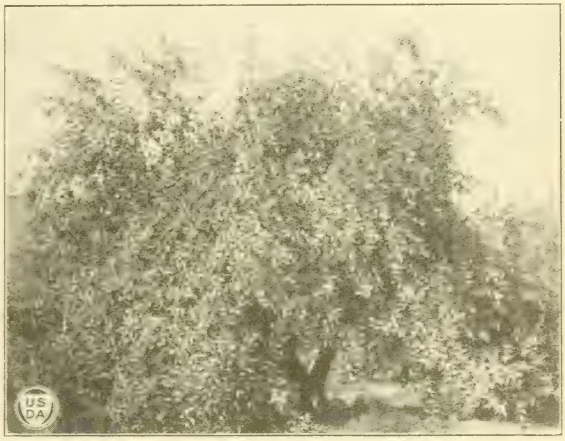

FIG. 24.—An old apple tree of the Jonathan variety at Gerrardstown, W. Va., in the Virginia Valley and Ridge region.

It is preferred to the Baldwin in West Virginia in all but the extreme northern part. In Kentucky, Tennessee, and northern Alabama it is one of the most desirable varieties of its season.

Lady.

The beautiful little Lady apple is of excellent quality and is used chiefly for decorative purposes, especially in the holiday season. It is grown but little in this area, but does well wherever observed. The tree is an open spreading grower, is long lived, and productive. In western Kentucky it is somewhat subject to apple blotch, apple scab, and sooty fungus. In northern West Virginia it reaches a high degree of perfection.

When grown for the special trade as a decorative apple, this variety may prove profitable in small quantities.

Lady Blush.

The Lady Blush variety is found in a few orchards in the Interior Low Plateau region in Kentucky. The tree is small and very productive; the smaller branches are very drooping and slender. The fruit is small; yellow

in color with a red blush. It has the distinct flavor of the Maiden Blush, which, together with other characteristics, would suggest that variety as its parent. It is of good dessert quality and ripens during the latter part of August in the region where seen. The fruit, however, is too small to be of commercial value.

Lawver.

In Kentucky and Tennessee as well as in most other parts of the United States the Lawver variety has not borne well. The fruit is subject to scab and apple blotch and drops before ripening. In West Virginia it usually bears well, is one of the highest colored and smoothest of all varieties, and keeps well. Its faults, however, are such that it is not liked by growers in West Virginia, and it is too poor in dessert quality to be grown in this area.

Leeper. Synonym: *Leeper's Beauty.*

As grown at Kevil, Ky., the Leeper variety is a productive and annual bearer. The fruit is subject to the scab fungus, but is large and the latest keeping variety of a large number grown. It is liked especially for this last-mentioned characteristic, and where a very late keeping variety is wanted in the Gulf Coastal Plains region it should prove of value.

Limbertwig.

The Limbertwig is found in all the regions in this area, and in the northern part of the East Tennessee Valley region many seedlings of it have originated which resemble it more or less closely. Neither the Limbertwig nor its seedlings are of much value in any part of this area, as the fruit is very subject to the scab, black-rot, bitter-rot, and blotch. The trees are also subject to blight. In addition to these faults the fruit is unattractive in color. It is not likely to fill any large place in the future orchards.

Livland Raspberry. Synonym: *Lowland Raspberry.*

In some parts of the United States the Livland Raspberry apple has proved promising as a red-striped variety ripening with the Yellow Transparent. In the Gulf Coastal Plains and Interior Low Plateau regions, where it has been grown to some extent, it has not proved desirable. There the tree blights badly and is not an early bearer. The fruit is poorly colored, rarely having more than a trace of red. It is one of the most tender skinned of all varieties, and when shipped any considerable distance will arrive in a worthless condition unless handled with great care.

In the northern part of the East Tennessee Valley region and in West Virginia the tree does not bear as early as the Yellow Transparent nor does it blight as badly, while the fruit is of better dessert quality. The fruit is usually highly colored there and ripens about with the Yellow Transparent and Early Harvest, but lasts much longer. In these parts of the area it may prove to be a desirable variety.

Lowry. Synonyms: *Mosby's Red Winter, Dixie.*

Except in the Virginia Valley and Ridge region only occasional trees of the Lowry (*63*, 1910, p. 426) are found in this area, and its commercial value is hard to estimate. In the Virginia Valley and Ridge region and in the Blue Ridge region in Virginia it is grown commercially and is liked. In the Yearbook article already cited the Lowry was named as worthy of testing in commercial orchards from Pennsylvania southward.

The tree is a vigorous open grower and bears well even when rather young; the foliage is susceptible to cedar rust, more so than that of the York Imperial. The fruit is medium in size and sufficiently uniform to make it suitable for box packing. It is highly colored with bright red over the entire surface. The flesh is fine grained, crisp, rather juicy, and mild subacid in flavor. Its rich flavor makes it a desirable eating apple, and its dessert quality is good to very good. In the northern part of the East Tennessee Valley region at Midway, Tenn., it ripens during the last of August to the middle of September. In the eastern Panhandle of West Virginia it ripens during the latter part of September and keeps into early winter.

The dessert quality and flavor of this variety place it in the same class as the Delicious as a desirable fall and early winter eating apple. It seems to ripen about the same time, but keeps rather better than the Delicious. Its fruit, however, is smaller than that variety, and the foliage is more subject to cedar rust. It should be tested to determine its desirability as a dessert variety in the northern portions of this area.

Loy.

The Loy variety is being grown in orchards in the eastern Panhandle of West Virginia and is considered desirable by those who raise it. In two 6-year-old orchards many trees were bearing a good crop, ranking next to Jonathan and King David in early bearing. At the Ohio experiment station (*21*, p. 106) it has proved to be very productive, bearing on alternate years.

Trees 6 years old in this region are more vigorous than trees of the York Imperial of the same age and are open and spreading in habit of growth. The foliage is very resistant to cedar rust. The fruit is large, oblate, and bright purplish red in color, with large prominent russet dots. The flesh is firm and rather coarse, has a mild subacid flavor, and compares favorably with the Baldwin in dessert quality. It can be picked very late and will keep until May.

It is promising for trial in commercial orchards in the Virginia Valley and Ridge region and in the Allegheny Plateau region because of the large size of the fruit, for its late keeping, and for the productiveness and health of the tree.

McCroskey.

The McCroskey (*64*, p. 111) is a seedling of the Winesap which originated on the place of the late H. M. McCroskey, near Glenlock, Tenn. At present it is distributed very little.

The tree resembles that of the Winesap, though its limbs are somewhat more slender and drooping. Where grown it equals the Winesap in productiveness. Its foliage is somewhat subject to the cedar rust. The leaves are very small and of the Winesap type. The fruit is medium to below medium in size at Midway, Tenn., in the northern part of the East Tennessee Valley region, while the Winesap is somewhat larger. It is as highly colored as the Winesap and of similar color. Its dessert quality is very good, and its season in the East Tennessee Valley region is very late.

Because of its excellent dessert quality and because it is a longer keeper than the Winesap and has many of the good tree and fruit characters of that variety, it should be tested in all regions where the Winesap reaches good size, and especially in the southern limits of apple growing, where a very long-keeping apple is desired. In the northern range of the Winesap the McCroskey may prove too small to be of much value.

Maiden Blush.

Though not found in large commercial orchards, the Maiden Blush apple occurs in home orchards in all sections in this area.

It is reported to be one of the most regular in bearing of all varieties. In some places the tree blights to some extent, but otherwise it is very vigorous and healthy. In the Gulf Coastal Plains and Interior Low Plateau region of Tennessee it ripens the last of July. In the central part of the Interior Low Plateau region of Kentucky its season is about the middle of August and in West Virginia the first part of September. It is considered a valuable variety for its season for local market and in home orchards in all regions in this area.

Mann.

The Mann apple is found in many of the orchards of Kentucky and West Virginia, and the greater portion of the trees are of approximately the same age. The trees are upright in growth, becoming somewhat spreading with the weight of fruit, and mature trees are usually quite open. The fruit is somewhat subject to apple blotch, usually of medium size, oblate in shape, uniform in size and shape, and dull to bright green in color, with large, conspicuous characteristic dots. The fruit is not very good in dessert quality, but usually keeps well and sells for a fair price. The trees are not very productive in this area, and the fruit is inclined to fall before maturing. It is not generally considered desirable.

Milam.

The Milam is frequently seen in the hilly and mountainous parts of this area and but rarely in the Interior Low Plateau and Gulf Coastal Plains regions. It was one of the first varieties to be grown and is still grown because of its good dessert and good keeping qualities and its productivity. The fruit, however, is too small for market purposes and is subject to apple blotch and sooty fungus. Its place is being taken by varieties of greater commercial value.

Missouri. Synonym: *Missouri Pippin.*

The Missouri apple, though widely tested, has proved to be of little value in any part of this area. In the Interior Low Plateau region at Franklin, Tenn.,

one orchard of it was cut out, as the fruit was too small and too severely attacked by apple blotch to be marketable. The tree is also subject to blight and the foliage to cedar rust. Where the fruit is large enough for market, it is desirable because of its bright-red color and good-keeping qualities. The tree, however, is not generally a regular bearer, and the fruit is of poor dessert quality and subject to scab and blotch.

Mother. Synonym: *Queen Ann.*

In this area Mother (*63*, 1909, p. 376) is found in commercial orchards in the northeastern part of West Virginia, where it is considered desirable. It is there grown for the special markets to which its high dessert quality entitles it.

The tree is productive and a regular bearer. The fruit ripens at Keyser, W. Va., during the middle and latter part of September and keeps well till the holiday trade in cold storage. Its handsome red color and excellent dessert quality make it especially desirable where a fall apple of its season is wanted.

Mountain June.

The Mountain June apple originated on the grounds of the Industrial School at Fountain Head, Tenn. The original tree stands in the front yard of that school, where it was planted as a seedling by a Mr. Sleider some time prior to 1890.

The original tree is of very large size and still in sound condition. It is upright, spreading, and rather open in growth, but slightly affected by twig blight and by blotch on both fruit and twigs. It is a medium grower in the nursery. The fruit begins to ripen during the first part of July and continues throughout that month. It is red in color, of medium size, and of good dessert quality. Its record of productiveness indicates that it is one of the best varieties in the early-apple orchards about Portland, Tenn. Its adaptation outside of this section is not known.

Northern Spy.

The Northern Spy is frequently seen in this area, but is not found in large blocks in any orchards. In the southern sections of this area it is not of good quality, lacking entirely the aroma and tender flesh of the northern-grown fruit of this variety. In the higher altitudes and northern parts of West Virginia it retains a little of the characteristic aroma and good dessert qualities of the variety at its best, but is very subject to water-core, and the fruit is inclined to drop before maturity. At its best in northern West Virginia it makes a very large healthy upright tree, becoming spreading with age, and the fruit keeps till Christmas in cold storage. Several pickings must be made to gather the fruit at its proper stage of maturity.

In the Gulf Coastal Plains region the fruit matures about August 15 and in central Kentucky about the middle of September. It is not being planted in commercial orchards at present in this area.

Northwestern. Synonym: *Northwestern Greening.*

The Northwestern apple was formerly planted in many commercial orchards of this area.

The tree is very subject to blotch cankers and is not long lived, though very vigorous when young. It becomes large and spreading at an early age and is usually productive. The foliage is susceptible to cedar rust, and in Kentucky the fruit is subject to apple blotch and drops badly. The fruit is large, uniform in size and shape, fair to good in dessert quality, and is frequently sold to be used for baking. The fruit keeps to midwinter in cold storage.

There seem to be no characteristics of this variety which make it especially desirable when compared with other varieties of its season commonly grown in this area.

Oldenburg. Synonym: *Duchess of Oldenburg.*

The Oldenburg is grown commercially in early-apple orchards of the Interior Low Plateau region, the Gulf Coastal Plains region, and to a slight extent in other regions.

The tree is vigorous, but not a large grower; it becomes spreading and open from the weight of fruit; it is quite resistant to blight, rather subject to apple blotch, and is usually an annual bearer. It will generally bear a paying crop younger than any other early variety. The foliage is resistant to cedar rust. The fruit is usually of medium size and oblate in shape. Under Tennessee conditions it is picked before it becomes highly colored, but will become attractively colored in all parts of this area if allowed to mature on the tree. In the Interior Low Plateau region and the Gulf Coastal Plains region in Ten-

nessee the fruit is very subject to apple blotch, sometimes half of the crop being lost because of it. This disease is controlled readily, however, by spraying with Bordeaux mixture. The fruit is too acid to be used as a dessert variety, but is very desirable for cooking purposes. It ripens in the Interior Low Plateau and Gulf Coastal Plains regions in Tennessee from June 24 to July 6, according to the location. It may be harvested in one or two pickings, maturing its crop in a shorter time than most varieties. It stands shipping very well for an early variety.

Reports from most parts of this area indicate that the Oldenburg is the best variety of its season for home and commercial orchards, and it is one of the most profitable of any in early-apple orchards in all regions of this area.

Oliver Red. Synonym: *Senator.*

In Kentucky and West Virginia where tested, the Oliver Red apple (*63*, 1906, p. 357) has proved to be an excellent dessert variety and moderately to very productive. In the Gulf Coastal Plains region of Kentucky, however, the fruit proved to be one of the most susceptible to apple blotch. In West Virginia the foliage has proved susceptible to cedar rust, and the tree is not uniformly productive. The fruit, though of very attractive color, good size, and excellent dessert quality, does not keep very well. It needs further trial to determine its value.

In the Ozark region of Missouri and Arkansas the tree is very subject to diseases and the fruit is irregular in size and grade.

Ontario.

The Ontario variety originated from a cross between the Wagener and Northern Spy, and is considered a valuable apple in some northern apple sections. It is found in a few orchards in the Allegheny Plateau region of northern West Virginia. There it is too poorly colored to compete with other more highly colored varieties of its season. It is large to very large in size, usually ribbed, and too acid for eating purposes. Its season is fall and early winter in northern West Virginia.

Paragon.

The Paragon apple originated at Fayetteville, Tenn. (*69*), and is commonly grown in this area as well as in other parts of the South. As it resembles the Arkansas very closely in tree and fruit characteristics, the description of that variety applies to this apple also.

Pennock. Synonym: *Phoenix.*

The Pennock is one of the varieties found in the older orchards of the area, especially in West Virginia and eastern Tennessee, but never found in large numbers. It usually bears well and keeps well through the winter.

The tree grows to very large size, is long lived, and spreading and open in growth. The fruit is large, rather well colored, and shaped much like the York Imperial. Its dessert quality is good, but it is not considered to be the equal of other varieties of its season and is not being planted further.

Pryor. Synonyms: *Pryor Russet, Pryor Red, Rusty Coat.*

The tree of the Pryor variety is healthy, long lived, and grows to very large size, becoming spreading and rather open. The foliage, however, is one of the most susceptible to cedar rust. The fruit is of medium size, subject to bitter-rot and apple blotch, rather bright red, and slightly or almost entirely russeted. It is quite acid and more desirable as a cooking apple than for dessert purposes. It is said to be desirable for cooking when half grown.

Though in some orchards it seems to be productive, the Pryor is sometimes reported as unproductive. It is not now being planted, as there are other better varieties of its season.

Pumpkin Sweet. Synonym: *Pound Sweet.*

This winter sweet apple, which is found in northern apple districts, bears very well wherever observed in this area. The fruit is very large in size, bright green, becoming yellowish green in color, overspread with a scarf skin, sweet, firm, crisp, juicy, and good to very good in dessert quality. In the southern part of the Allegheny Plateau region it probably matures too early to be of value except in the home orchard. In the extreme northern part of this region at altitudes of 1,000 to 1,500 feet it ripens in the latter part of September and keeps till about Christmas. Under such conditions it develops to a high degree of perfection and is considered desirable by those who wish a sweet apple of its season for home use. It is inclined to water-core badly and is not as desirable for this reason as it otherwise would be.

Ralls. Synonyms: *Rawles Genet, Geneton, Janet, Neverfail.*

Though widely distributed throughout this area, the Ralls variety is not being planted at present because the tree is very subject to blight, the foliage to leaf-spot, and the fruit to sooty fungus, apple blotch, and bitter-rot. It is rarely highly colored, and only the most thorough spraying enables the orchardist to secure a clean crop. The tree, however, blossoms late, so that it is a reliable bearer, especially where late spring frosts occur. The fruit, though small, is of very good dessert quality and keeps till late in the winter in ordinary farm cellars.

Rambo.

The Rambo variety is common in the home orchards in the northern part of this area. Although the tree is small, it is long lived, healthy, upright, rather open, and usually productive. On young trees the fruit is large, but as the tree grows older the fruit becomes medium to below medium in size. It is attractive in color, juicy, tender fleshed, aromatic, and very good to best in dessert quality. It is very desirable for both dessert and culinary uses. In that part of the Allegheny Plateau region located in West Virginia it is a fall apple. It is probably not adapted to the general market, as it is too easily bruised and does not keep well enough. Because of its high dessert quality and productiveness it will long be grown in the northern part of this area in the home orchards and for local markets.

Red Astrachan.

In fruit-growing regions of the northern United States the Red Astrachan is one of the most widely planted early apples. In all parts of this area, however, it has such serious faults that it has proved unsatisfactory. In the early-apple orchards of all regions in Tennessee the trees are short lived, do not bear well when young, and are not generally productive. The fruit matures through a long season and is subject to apple blotch and scab. In the northern parts of this area, though more productive, it ripens through too long a season and before ripening rots too frequently to prove desirable.

Red June.

The Red June is an old variety, one of the best known throughout the southern part of this area, but is grown to some extent in all the regions. Recently, its place has been taken by other varieties better adapted to present requirements. The tree does not grow to large size in the southern part of this area, although large trees are sometimes found farther north. The tree is very subject to blight and is short lived. Its foliage is susceptible to cedar rust. The fruit is usually small, too soft to ship well, and ripens through too long a season to be good for commercial use. It ripens in the Gulf Coastal Plains region in Tennessee during the last of June and the first part of July.

There are many trees of the Red June type, which are probably seedlings of it, scattered throughout this area, some of which are decidedly superior to the Red June. Some of these are known very slightly, while others have been propagated to a considerable extent. The Coffman appears to be one of these of about the same season as the Red June, yet superior to it as far as tested. Thompson June and Wilson June are other varieties of the Red June type also superior to it. The Striped June, similar in practically all respects excepting its striped color, is frequently grown under the name Red June.

Rhode Island Greening. Synonym: *Rhode Island.*

The Rhode Island Greening is a northern variety, grown to a slight extent in the northern part of this area. In the Interior Low Plateau region it seems to be more susceptible to blight than the Yellow Transparent. In the Allegheny Plateau region in West Virginia it is affected to a less extent. Moreover the fruit is subject to apple blotch wherever that disease is prevalent and is inclined to drop before ripening. For these reasons, as well as because its season is too early to make it of value as a winter apple, as in New York State and in New England, it is not recommended.

Rome Beauty. Synonyms: *Rome, Roman Beauty.*

The Rome Beauty originated in Lawrence County, Ohio, just across the Ohio River from Huntington, W. Va. Commercial orchards of it are now found in all apple regions of this area, but it seems to develop better under the conditions near its place of origin than elsewhere in this area. The Allegheny Plateau region, including the parts of Ohio and West Virginia adjacent to the Ohio River, is widely known as a center of the culture of the Rome Beauty, and the largest acreage of this variety is found in this region.

The tree, at first, is an upright grower, but at bearing age becomes open and spreading and later most of its limbs become decumbent and the top dense. Sometimes it may bear a full crop at 8 years of age, but usually it is 10 to 12 years old before bearing well. Owing in part at least to its late-blooming habit, it is one of the most reliable croppers in the northern Allegheny Plateau region. The fruit, though often attacked by sooty fungus, apple blotch, black-rot, and bitter-rot in the southern parts of the regions of this area, is usually comparatively free from these in West Virginia. The fruit keeps in storage until spring in the Allegheny Plateau region, but usually loses much of its flavor after January 1. Its uniformity in shape and size make it suitable for box packing.

In the southern part of this area it is very subject to blight and does not keep well enough nor bear well enough to compete with other more productive varieties. The same is true of most of the Interior Low Plateau region in Kentucky, though conditions along the Ohio River, especially in the section near Covington and from that place up the river to Huntington, W. Va., more nearly approach the conditions of the place of its origin. Along the Big Sandy River in Kentucky the conditions are also similar. In the Virginia Valley and Ridge region the York Imperial takes the place filled by the Rome Beauty in the Allegheny Plateau region. Both sorts are susceptible to cedar rust to about the same degree. They ripen at about the same time, the Rome Beauty being often picked first, and both keep about the same length of time in cold storage. In this area neither variety bears regular crops at an early age, but in the Allegheny Plateau region of West Virginia both produce regularly after coming into bearing. Because the Rome Beauty frequently does not reach high color in the Virginia Valley and Ridge region, while the York Imperial is usually high colored, it is not yet largely grown there. It has not been planted in recent years as widely as formerly in the Allegheny Plateau region. However, there is no variety which as yet stands out with sufficient merit and popularity to succeed it.

Roxbury. Synonym: *Roxbury Russet.*

Occasional trees and small orchards of the Roxbury variety have been observed in all parts of this area.

The trees bear when quite young, 6-year-old trees bearing a fair crop at Belington, W. Va. The tree grows to very large size, is healthy, and bears fair crops. The fruit is usually of medium size, oblate, and covered with russet. The flesh is firm, subacid in flavor, and good in dessert quality. In northern West Virginia the fruit will keep through midwinter in cold storage.

It is considered desirable wherever grown, but is surpassed by more productive varieties of more attractive color for both commercial orchards and home use.

Salome. Synonym: *Winter Rambo* (erroneously).

The Salome is found frequently in the orchards of all regions of West Virginia and rarely in the remainder of the area. It is being superseded in this area by other varieties of more attractive color, better dessert quality, and which keep longer.

Shackleford.

The Shackleford variety is found in several commercial orchards in this area. Besides maturing in the summer in Kentucky and farther south, it is subject to the diseases to which the Ben Davis is subject and to a similar degree. In West Virginia, though it develops well, it is not so good a keeper as the Ben Davis and seems inferior to it in every way.

Shockley.

Though widely distributed in this area, the Shockley appears very little in commercial orchards. Where it is grown it is frequently sold for decorative purposes as it is of small size and becomes highly colored under favorable conditions. It has been grown because it keeps well in common storage. As its foliage is very susceptible to cedar rust and the fruit to apple scab, apple blotch, and cedar rust and is not of high dessert quality, it is not desirable.

Shortcore. Synonyms: *Brassfield, Garden Red.*

The Shortcore variety and its many seedlings, or related forms, have been distributed in the hills and mountains of eastern Kentucky and probably into northern Tennessee. The Shortcore seems to have been propagated by sprouts from the roots. The most striking characteristic of this group is that though the apples are small, the basin is larger and deeper than that of other varieties, while the cavity is small and shallow. The effect of this is to make a very short

core, hence the name. The Shortcore is said to have originated in an old orchard belonging to a Mrs. Todd, near Berea, Ky.

The trees are small and productive. The fruit matures in late fall and winter at Rockford, Ky. It averages small to medium in size, is deep red over the entire surface, and is of good dessert quality. However, it is without commercial value.

Smith Cider. Synonym: *Moore's Extra.*

Excepting in north-central West Virginia, the Smith Cider variety is not liked in this area. In that part of the Allegheny Plateau region, however, it bears well, is highly colored, and is not seriously affected by blight nor the fruit by black-rot or apple blotch. In all regions of Kentucky and Tennessee and at the lower altitudes in the Allegheny Plateau region of West Virginia it is affected seriously by these diseases and is not satisfactory. Because of the faults enumerated above, and because it is not uniformly productive and is very little better than the Ben Davis in dessert quality, it is not being planted in this area and is being replaced by better varieties.

Smokehouse.

The Smokehouse variety is among the apples considered most desirable and most commonly grown in the home orchards of the northern Virginia Valley and Ridge region, and the Allegheny Plateau region. It has not been observed in the other regions of this area.

The trees are productive, healthy, vigorous, spreading, with drooping slender twigs, and grow to large size. The fruit is large, oblate, and usually highly colored with red stripes. It is aromatic, very good in dessert quality, and will keep to midwinter in cold storage from orchards at the higher elevations.

Smoky Twig.

The Smoky Twig variety is grown to a slight extent in the Gulf Coastal Plains region of Kentucky. The trees are upright, extremely vigorous, and very productive. Unless carefully pruned, the trees are difficult to spray and the fruit is hard to pick. The fruit is large and is desirable because of its long-keeping qualities. It has not been sufficiently tested for its value to be fully known.

Springdale.

The Springdale is found in a few commercial orchards in the Valley and Ridge region of West Virginia and is occasionally seen in other parts of this section. The fruit is subject to bitter-rot and Baldwin spot, is commonly irregular and rough, and is usually easily bruised. It is not of high dessert quality and is excelled generally by many other varieties. At Stanton, Tenn., in the Gulf Coastal Plains region, however, in one orchard which has been thoroughly sprayed it is proving desirable. The fruit is not as rough there, is highly colored, is one of the latest to be picked, and is one of the best-keeping varieties. Figure 25 shows a tree of this variety.

Stark.

Although not a prominent commercial variety, the Stark is one of the most widely distributed varieties in commercial and home orchards of this area. It is regarded as a good winter apple in West Virginia and northern Kentucky, but farther south is not a winter variety and is too subject to apple blotch and blight to be desirable. In the section about Lexington, Ky., it is considered a desirable sort, as the trees bear well and the fruit grows to large size and keeps till spring in cold storage. Because the color of the fruit is usually poor and its dessert quality is not high, it has not been planted much in recent years and does not rank as a first-class commercial variety.

Stayman Winesap.

No variety has been planted more extensively in recent years and is giving better satisfaction in this area than the Stayman Winesap (*63*, 1902, p. 470). It is being widely planted throughout the apple districts of the United States south of those in which the Baldwin succeeds best. It is proving very desirable for both commercial and home use, except where it does not color sufficiently.

The tree is one of the best and most rapid growers in the nursery and orchard. It is quite resistant to blight and the foliage to cedar rust. Its branches are somewhat brittle in certain localities and sometimes break under a heavy crop. This is not common, however, and rarely has the loss been serious. It bears regularly. In one 9-year-old orchard in western Kentucky the trees had averaged 10 bushels per tree for their total crops up to that time. On the poorer soils throughout all regions in this area the tree bears at an early age, while on heavier and richer soils it may not begin to bear well until 8 or

10 years old. The fruit approaches best in quality in many sections in this area and is always a desirable dessert and cooking variety.

In all regions in Tennessee and in the Interior Low Plateau and Gulf Coast Plains regions of western Kentucky it is usually large and highly colored and is considered one of the most desirable varieties. It is better in dessert quality there than in more northern regions. Under a high state of cultivation on young trees the fruit sometimes cracks badly and is poorly colored, but such troubles have not been observed except under these conditions. In this part of the area it is about as resistant as the Winesap to diseases of the tree, foliage, and fruit and is considered by some growers as more profitable than that variety. The wood of the tree is not so resistant to cold as the Winesap. It grows more rapidly and the fruit is much larger, making the yield much greater than from the Winesap.

In the Allegheny Plateau region in West Virginia, though large enough, the size of the fruit is usually much smaller than it is farther south in Kentucky

FIG. 25.—A Springdale apple tree at Gerrardstown, W. Va., in the Virginia Valley and Ridge region.

and Tennessee. The color of the fruit is usually as high, but quite different. It has a gloss and brightness in this part of the area representative of the variety at its best. On very rich soil, however, the fruit has the large size characteristic of it in the regions of western Kentucky and in all of Tennessee, and on such soils is not usually highly colored. In the Virginia Valley and Ridge region the fruit is generally large and highly colored, though in the richer soils it does not color as well as on less fertile soils. In this part of the area the tree bears earlier and the fruit is distinctly better in dessert quality than the York Imperial and Rome Beauty, and it outsells those varieties in the general market.

Striped June.

The Striped June variety is substantially the same as the Red June in tree, leaf, and fruit characteristics except that the fruit is somewhat striped with red instead of being a solid red color like Red June. The discussion of that variety applies also to Striped June.

Summer Pearmain.

The old Summer Pearmain variety is found in home orchards in most regions of Kentucky and West Virginia. The tree is long lived and bears regularly. It ripens about the first of August in the Gulf Coastal Plains region in Kentucky and the latter part of August in the Allegheny Plateau region in West Virginia. In dessert quality it is one of the best. It is grown for its high dessert quality, but is tender for market purposes.

Summer Rambo.

The Summer Rambo is grown in a few commercial orchards and in many home orchards of this area. The tree grows to very large size, is vigorous, healthy, spreading, and open. The fruit is large, attractively colored, and of very good dessert quality. For its season it is considered a profitable summer variety.

Sutton.

The Sutton variety, which is considered desirable in some places in the northern fruit districts, is found in a few orchards of northern West Virginia. It probably does not yield well enough to be of great value in commercial orchards. The tree in that section is very upright and open, having few small branches. The fruit is highly colored, medium to large in size, good in dessert quality, and keeps till early winter in cold storage.

Thompson June.

The variety known as the Thompson June originated on the place of Terry Thompson, near Florence, 9 miles from Paducah, Ky. It is considered an excellent and an early bearer, 5-year-old trees bearing good crops at Kevil, Ky. The trees are upright in growth, subject to blight. The fruit is of good size, oblong truncate, a very attractive red in color, with a heavy scarfskin and large dots. It is not as good in dessert quality as Red June, but is considered a desirable cooking variety. It ripens during the last of June, as the last of the Early Harvest are picked, and continues in season through July, making it more desirable for the home orchard than in commercial plantations.

Tolman. Synonym: *Tolman Sweet.*

The Tolman, a winter sweet apple of northern apple districts, has proved very uncertain in this area and is rarely profitable. In many places the tree has not been productive and the fruit small and worthless. In other places the tree has not been healthy. Altogether it has been too unsatisfactory to be grown in the future.

Tompkins King. Synonyms: *King, King of Tompkins County.*

The Tompkins King variety, which is considered very desirable in some northern regions, is without much value in any of the orchards where it is grown in this area, as nearly all the fruit is water cored, and it does not have the high dessert quality that it possesses when grown farther north. The fruit is usually higher colored than that from northern regions, but it drops badly. Altogether its faults are too serious to warrant growing it in any of the regions of this area.

Traders. Synonym: *Traders Fancy.*

The Traders apple is found in a few orchards in West Virginia and occasionally in the other States. In Knox County in eastern Tennessee the fruit water cores so badly that it is of little value. In West Virginia it is an attractive dark red in color covered with a heavy bloom, medium in size, very firm, sweet, and of good dessert quality. It keeps in cold storage until late winter and is considered desirable for the local market in the Allegheny Plateau region of northern West Virginia.

Twenty Ounce.

The Twenty Ounce variety ripens during the last half of September in northern West Virginia, where it is considered a good apple and is fairly profitable.

The tree is usually small, has characteristic drooping branches, and is reported to be very susceptible to blight. The fruit is highly colored, and though it usually has a rough surface in this region, it is smooth for the variety. It is being superseded by other varieties of better dessert quality.

Virginia Beauty.

In the northeastern part of the East Tennessee Valley region the Virginia Beauty (*63*, 1905, p. 495) variety ranks with Delicious in productiveness, beauty, dessert and keeping qualities, and is one of the most desirable varieties; in that section both are late fall apples. At altitudes of 3,000 feet in

the mountains of North Carolina and southwestern Virginia its season is early winter to midwinter. It has been seen very little outside the section of Tennessee mentioned above, not sufficiently to properly estimate its value. Because of its high dessert quality it should be tested in West Virginia for its commercial value and for home orchards.

Wagener.

The Wagener variety, widely used in northern regions as a filler because of its small tree and its fine fruit, is rarely found in this area. In northern Alabama it matures with scarcely a trace of the handsome color that characterizes it in regions to which it is adapted. There it is also small in size and ranks only good in dessert quality. It is rarely found anywhere in the States of Tennessee and Kentucky. In West Virginia it is found in home plantings, but not in commercial orchards. Although its dessert quality is good and it is high colored, the fruit drops, sometimes badly, and the tree has not been uniformly productive. Further observation may indicate characteristics of sufficient value to warrant planting this variety, but it seems to be inferior to many others in productiveness, size of fruit, and dessert quality.

Wealthy.

The Wealthy is one of the most widely grown varieties in the United States, and it is one which has proved successful in nearly all sections of this area. Its weak points as a commercial variety are (1) its foliage is one of the most susceptible of all to cedar rust, (2) it is necessary to harvest the fruit in two or more pickings in order to get it in the best condition, and (3) when the trees become mature the fruit is usually very small. On the other hand, the tree bears at a very early age and is one of the most reliable croppers; the fruit is highly colored and good to very good in dessert quality. In the Interior Low Plateau region in Tennessee it is considered a desirable summer apple, ripening during the latter part of July. In the eastern Panhandle of West Virginia it ripens in August. Because the tree is small it is desirable for planting between other varieties as a filler. When so used, the trees may be cut out by the time the tree becomes mature and the fruit becomes small in size.

Willowtwig.

The Willowtwig is chiefly grown in the northern Panhandle of West Virginia. Outside of this section only occasional trees and small blocks of it have been observed. In the northern Panhandle section of West Virginia, however, it has been the leading variety for more than a generation. The tree is long lived and is an early and regular bearer. The fruit is uniform, of good size, but of only fair color. The fruit, in large part, is placed in cold and common storage houses and kept till spring. Though not of good dessert quality, it holds its flavor better than most varieties. The section in which it is grown most lies close to the Ohio River, and the smoke from factories along that stream affects most varieties severely, dwarfing the fruit. Though Willowtwig is not immune to injury and it is necessary to clean the fruit before sending it to market, it is affected much less than other varieties. Its culture is not being extended outside of this section because of its poor color and poor dessert quality. In this section, however, it has proved to be a profitable variety on account of its good keeping qualities and its productiveness.

Winesap.

In these States no other variety has yet proved so uniformly profitable and so well adapted to such a wide range of conditions as the Winesap. While known as a "rich-land" variety, it nevertheless develops well in these States on soils of moderate fertility. The Stayman Winesap, a seedling of the Winesap, and the Kinnard, which belongs to the Winesap group, are proving valuable varieties, maturing earlier than the Winesap. The Arkansas (*Mammoth Black Twig*) is another variety of the Winesap group which matures with the Winesap. However, Arkansas must prove to be more productive before it can take the place of the Winesap, which is an annual bearer in all regions of Tennessee and Kentucky. Certain orchards of the Winesap managed in the most approved manner have produced large crops each year for many years. (Fig. 26.)

The Winesap tree is one of the most resistant to blight, and only occasionally is blossom blight serious. In neglected orchards the black-rot canker is sometimes serious, and when efforts are made to renovate such orchards this canker may continue to be troublesome. In well-managed orchards no such

difficulty has been found. The foliage of the Winesap is resistant to cedar rust and not especially susceptible to other diseases.

The fruit is usually left on the tree until it begins to drop. Fruit from northern Alabama has kept in excellent condition in cold storage until the last of March. It is somewhat subject to apple scab, although this disease is worse in northern Kentucky and other northern sections than farther south. It is less susceptible to this disease than is the Kinnard. The Winesap is found profitable in all parts of Kentucky and Tennessee.

In the extreme northern part of Kentucky and in a few places in the eastern portion near the Big Sandy River the fruit is rather small, being nearer in size to that of the variety grown in West Virginia. In the latter State the tree is productive and healthy, but the fruit is almost always small. Under such conditions growers have planted other larger fruited varieties that pay better. In the Virginia Valley and Ridge region of West Virginia on very fertile soil it sometimes becomes large enough to be quite profitable and is found in several orchards. It is, however, not largely planted in this region in West Virginia. The color of the Winesap in the orchards of the Virginia Valley and Ridge region is particularly attractive.

FIG. 26.—An orchard of Winesap apples at Henderson, Ky., in the Interior Low Plateau region, which has borne large crops for 10 successive years.

Winter Paradise. Synonym: *Paradise Sweet.*

The principal winter sweet apple of this area is the Winter Paradise. The trees are productive, the fruit of good size, smooth, green in color, with a bronze blush, of good dessert quality, and fruit from the Allegheny Plateau region of West Virginia keeps until late winter in cold storage. It seems to merit its place at the head of the list of sweet apples for its season for both home and commercial orchards.

Yates.

The Yates is commonly found in the home orchards in the southern part of this area. Its chief merits are its productiveness and long-keeping quality throughout the winter in common storage at the southern limit of apple growing. Wherever the Winesap can be grown and will keep well in the southern part of this area, that variety is preferred. Furthermore in all of this area except the southernmost part of Tennessee the Yates is not generally productive, and the tree is subject to blight.

In southern Tennessee the tree is productive and is an early and annual bearer. The fruit is attractively colored and attains large size for the variety, but is very small for market purposes. It is picked during the last of October and is the best keeping variety grown there. It ranks above good in dessert

quality and is desirable for the home orchard. Terry, which resembles Yates in many ways, has larger fruit and is replacing it in Georgia. Figure 27 shows a row of trees of Yates.

Yellow Bellflower.

Though distributed in nearly all parts of this area, the Yellow Bellflower is not being planted at present. Occasionally a tree of it bears a full crop of fruit in this area, but only in the northern Panhandle section of West Virginia has it proved profitable, and even there it is surpassed by other varieties. Further, it has comparatively little of the peculiar flavor which makes it so highly prized in more northern regions; it ranks only good in dessert quality.

Yellow Transparent.

The Yellow Transparent variety is well known in all the apple-growing regions of this country as the earliest ripening sort in commercial orchards, and it holds this same position throughout this area.

The Yellow Transparent tree is very upright when young, becoming somewhat spreading with age, vigorous, and bearing at a comparatively early age. The tree rarely becomes very large and is often used as a filler in com-

FIG. 27.—An orchard of Yates apple trees at Cleveland, Tenn., in the East Tennessee Valley region. For home orchards along the southern limit of apple growing this is considered one of the most desirable of all winter varieties.

mercial orchards. The trees may therefore be planted in the orchard closer than many varieties. It is one of the most susceptible to blight and is not long lived. When attacked by blight, this disease frequently spreads to the main limbs and the trunk of the tree. In such cases, if it encircles the trunk the tree dies. This variety generally shows a larger proportion of loss than any other from the effects of blight. Because of the damage by this disease many growers have discarded this variety, while others have decided that the profits, when a crop was secured, are large enough to make it pay. The fruit is medium in size, of a bright yellow color, and of good dessert quality. It is rather tender and in shipping must be handled carefully. In this area it would become one of the most profitable early apples if the tree were not so very susceptible to blight. When a crop of Yellow Transparent is harvested in the early apple orchards of Tennessee and Kentucky high prices are usually obtained. However, the average yield of the tree is small. In regions in northern West Virginia the blight is not so serious as in other parts of the area, and the Yellow Transparent there forms a desirable early-ripening variety.

York Imperial. Synonym: *Johnson's Fine Winter.*

The chief faults of this variety are that the tree is usually late in bearing, and when it comes into bearing it tends to produce large crops on alternate

years; the foliage is also subject to cedar rust and frog-eye, and the fruit scalds badly in storage. Some of the merits of the variety are the vigor and productiveness of the tree and the large size of the fruit. Figure 28 shows an early-bearing tree and Figure 29 a part of an orchard of this variety in the Virginia Valley and Ridge region.

Except at Dayton and Tazewell in the East Tennessee Valley region this variety has not proved profitable in Tennessee or Kentucky. The tree in these States is very subject to blight, is not very productive, and the fruit matures too early for the general market for which the variety is adapted.

In regions of northern West Virginia the blight is not often very serious in York Imperial orchards, and the tree is productive and the fruit highly colored.

FIG. 28.—A York Imperial apple tree, 6 years old, at Gerrardstown, W. Va. Only rarely does the York Imperial bear so large a crop at so early an age.

It is the leading variety in the orchards of the Virginia Valley and Ridge region in West Virginia and is one of the leading varieties in all sections of that State. The relative popularity of the variety is suggested by the fact that in 1914 in the orchards of nonbearing age in Jefferson County, W. Va., there were 878.2 acres of the York Imperial, 370.7 acres of Stayman Winesap, 298.2 acres of Arkansas, and 250.3 acres of Grimes Golden (*26*).

CHERRY VARIETIES.

In this area comparatively few cherries are grown. Many farmers have a few trees in home orchards, and around some of the larger

cities small orchards for supplying local trade are planted. No large orchards have been observed. Small orchards are more numerous in the northern part of this area than in the southern part.

Sweet cherries have been grown with a moderate degree of success for local market and home use in northern Kentucky and in West Virginia, but their culture is attended with great difficulties. Farther south they are unproductive, besides being attacked by an undetermined disease. Many varieties of sweet cherries are grown, but they have not been observed sufficiently to determine their relative value. The Tartarian, Wood, Windsor, and Schmidt sweet cherries have succeeded best.

The sour cherries are grown to some extent in all parts of the area and even on the higher altitudes in northern Alabama with a fair degree of success. They are not as productive as in more northern areas, however, and are recommended for home orchards and local markets only. Two varieties are considered desirable by growers, the Richmond and Montmorency. These varieties may be grown on

FIG. 29.—A York Imperial orchard on Apple Pie Ridge, at Gerrardstown, W. Va. This orchard is 24 years old and has rarely missed a crop.

any fertile soil in the area. The Richmond begins to bear at an earlier age than the Montmorency. On fertile clay soil near Knoxville in the East Tennessee Valley region at 3 years of age Richmond was observed to be producing a small crop, while trees of the Montmorency in the same orchard had not begun to bear. The fruit of the Richmond begins to ripen about 10 days before that of the Montmorency. It is not as large, is more juicy, and is not considered as good for canning as the Montmorency. Both varieties are bright red. They are usually found together in the same orchard in order to extend the cherry season over as long a period as possible.

PEACH VARIETIES.

The peach ranks second among the three important fruit crops of this area. While important in many sections of the area, the largest center of its culture is in the upper Potomac Valley of West Virginia. This section is hilly and mountainous, and orchards located on the higher points secure good air drainage.

In Kentucky local centers are found near Bedford, Shepardsville, Louisville, Bowling Green, and Covington.

In Tennessee commercial peach centers are found near Cleveland, Sale Creek, and Harriman. Many other points in these States have commercial peach orchards from which fruit is shipped. Table 2, on page 4, gives the stations shipping carloads of peaches in 1914, 1920, and 1921 and the number of cars shipped from each station.

It is probable that the points at which large orchard developments have taken place already are among the most advantageously located for peach growing. Nevertheless, small commercial orchards have demonstrated that peaches can be grown successfully throughout the area, provided suitable sites are selected. The one exception seems to be the Cumberland Plateau region, and yet even in this region varieties are being developed that do fairly well.

The large orchard developments have occurred where the transportation facilities are good and where the climatic conditions make it possible to market certain well-selected varieties at particular times. Thus, the upper Potomac Valley section can supply markets with peaches immediately after the Georgia crop is harvested, and because of its geographical location and railroad facilities the fruit can be shipped to markets in all directions.

The list of varieties found in the orchards of this area is very large, covering almost the entire range of those widely grown in the peach sections east of the Rocky Mountains. It includes also varieties grown very little in any other regions, as well as several originating within the area. Because of the extent of this list, the names of only the well-known varieties with notes on some of their important characteristics will be given here. Many varieties other than those listed are, of course, grown in the commercial orchards, but they do not stand out in the experience of a large number of growers as being particularly valuable in this area. Some of these may become leading varieties under different conditions or after more extended testing.

Growers in this area report that the market calls for yellow-fleshed varieties and that white-fleshed peaches are not desirable except for the early varieties. In addition to having yellow flesh, a variety to be suitable for commercial orchards in this area should be adapted to a wide range of soil types. If a variety of real merit is extensively grown in different sections, the market will learn to recognize it and will demand that variety. Thus, the Elberta is adapted to a wide range of conditions, and its firmness and shipping qualities are well known. Growers, buyers, and consumers all understand how to handle this variety, and it has become a standard peach of this area as well as of the country. Other desirable characteristics of an ideal variety for this area are hardiness of the tree and fruit buds and vigor and productiveness of the tree. Further, the fruit should be medium to large in size, highly colored, firm fleshed, high in dessert quality, and a freestone. If the skin is rather thick, the peach will ship better than a thin-skinned variety. The picking season of a standard peach should be short, as each extra picking adds to the cost of harvesting. A peach ripening uniformly over its entire surface is more desirable than one which softens on its suture ridge before being ready to pick.

The season of ripening is another important factor in the choice of a variety. Most orchardists in this area prefer to start with varieties coming into season after the Elberta crop of Georgia has been disposed of. Neither the white-fleshed nor the yellow-fleshed sorts ripening as early as the Elberta in Georgia sell readily. Thus, the season usually commences with the Elberta in the southern part of the area, with the Carman and Champion a little farther north, and with the Carman in northern West Virginia. Following the Carman most orchardists grow a succession of varieties in order to furnish steady work for a definite number of men. In the Potomac Valley section of West Virginia this list covers the period until cold weather. In the other sections the Elberta usually ends the season.

Excepting certain important varieties earlier than the Elberta, or varieties grown for some particular reason, white-fleshed peaches have been omitted from the following list of those characterized. Brief mention, however, is made of a few varieties that are grown to a limited extent which may be adapted to the local market or to home use.

COMMERCIAL VARIETIES OF PEACHES.

Beers Smock.

The Beers Smock is a yellow-fleshed freestone variety of poor dessert quality very similar to the Smock, but which matures slightly earlier and is larger. It ripens just before the Salwey, is slightly later than McCollister, Edgemont, Stevens, and Fox, and is considered the standard variety of its season in the upper Potomac Valley section. Formerly more Smock trees were found than Beers Smock, but in new orchards the latter variety is being set almost exclusively.

Belle. Synonym: *Belle of Georgia.*

The Belle is a white-fleshed, firm, freestone peach which is becoming the standard variety in all regions of this area for the period immediately before the Elberta and just after the Champion, usually overlapping the season of both. It is grown a little in the East Tennessee Valley region and is found in several commercial orchards of the eastern Panhandle of West Virginia. The fruit is medium sized on shale soils. It is usually highly colored and is considered a good shipping variety. It is one of the best varieties for home canning, ranking next to Champion.

Bilyeu.

Although it is a white-fleshed freestone peach, the Bilyeu is extensively planted in the Potomac Valley section in West Virginia, where it is regarded as the only profitable very late peach. It ripens there after the yellow-fleshed varieties have all been picked and is about the last peach from any section to reach the market. It seems to be adapted to both chert and shale soils in this section, but is especially desirable at high altitudes. The fruit is medium to large in size, usually nearly covered with a dull red color, and a good shipping peach. It is sometimes held in cold storage for a month after picking until market conditions are more favorable than at picking time. In this section of West Virginia it is picked usually from October 1 to 15.

Carman.

In the commercial orchards of the Potomac Valley section and in many individual orchards of this area the Carman is the first variety to ripen which is extensively planted. It is a medium-sized handsome white-fleshed variety classed as freestone, but it is a semicling under some conditions. It is inclined to soften on its suture ridge before being ready to pick. Occasionally on the chert soils of the higher altitudes of West Virginia growers prefer the St. John (*Yellow St. John*), which ripens at the same time, or slightly earlier. Generally, however, the Carman gives satisfaction even on chert soils, for the tree is more productive than the St. John and the fruit is a good shipper. It is considered the standard variety of its season in all parts of this area.

Chairs. Synonym: *Chairs Choice.*

The Chairs is a large, attractive, yellow-fleshed freestone variety, ripening with the Late Crawford immediately following the Elberta and too close to the season of that popular variety. It does not seem to be as generally grown in the Potomac Valley section of West Virginia as the Late Crawford, although it is considered better on chert soils by some orchardists. It is grown to a small extent and liked in the northern Panhandle of West Virginia. It was not observed elsewhere. Its chief fault is its unproductiveness. The Late Crawford and Chairs are the standard varieties of their season, although the Edgemont, which ripens during the latter part of the season of these varieties, is liked on the shale soils, is somewhat more productive, and is taking their place to some extent. In the Potomac Valley sections the Chairs is reported to be much better adapted to heavy soils of the lower altitudes than to the mountains and higher elevations.

Champion.

The Champion is a white-fleshed freestone variety which immediately follows the Hiley and is the standard variety of its season for this area.

At a few points on shale soil in the Potomac Valley section of West Virginia the Hiley is planted in its place, but usually ripens enough earlier to make Carman, Hiley, Champion, and Belle a desirable succession in this section. The fruit of the Champion is large, with high color, and of very good dessert quality. It is not a very good shipper, but carries well enough to be an important commercial sort. Its color and quality are better than Carman, and it is considered one of the surest bearers. It is the best of all freestone varieties for home canning. In the Potomac Valley section, as well as in many other sections of this area, it is reported to be much superior to the Mountain Rose, which ripens at the same time.

Early Crawford.

The Early Crawford is a widely known yellow-fleshed freestone variety of highest quality which ripens with the Champion. It is being discarded in this area in favor of the Champion, as it has proved to be too uncertain in bearing.

Early Wheeler. Synonym: *Red Bird.*

In the Gulf Coastal Plains region in Tennessee the Early Wheeler, a white-fleshed clingstone peach, has proved profitable, as it ripens very early, before many peaches come into the markets supplied from that region. The fruit is highly colored and ripens about 10 days before the Greensboro. In other regions it was not seen.

Edgemont. Synonym: *Edgemont Beauty.*

The Edgemont variety originated in western Maryland and is proving to be desirable for the season just after Elberta and late Crawford in the Potomac Valley section. In that section it is reported to be adapted to both the chert and the shale soils. In southwestern Virginia at an altitude of 3,000 feet it is regarded as too variable in size, but on further testing may prove to be more uniform. The fruit is large to very large, yellow fleshed, a good shipper, highly colored, a freestone, and of high dessert quality. It is reported as averaging larger in size and more highly colored than the Late Crawford, but is so similar that it can hardly be told from that variety after picking. Others ripening at the same period, or nearly the same, and which are extensively grown are McCollister, Chairs (*Chairs Choice*), Fox (*Fox Seedling*), and Stevens (*Stevens Rareripe*). Both the Fox and Stevens are white fleshed, while the yellow-fleshed McCollister is not always a sure bearer. Thus the Edgemont has good prospects of becoming a leading variety for its season.

Elberta.

Although the freestone Elberta peach is the leading variety in this area, it does not form such a large percentage of the entire peach crop as it does in many other sections. It seems to succeed on nearly every type of soil in the area where peaches of any variety are grown. In the East Tennessee Valley region it is by far the most important variety. In the Gulf Coastal Plains region of Tennessee it is grown for the local markets, while earlier varieties are grown for the general market. In Kentucky and West Virginia, although planted more than any other single variety, it is, nevertheless, considered more as the standard peach of its season to meet a definite sequence in ripening than as the predominating variety. Its popularity with growers is increasing in these States, and it is generally considered one of the most profitable of all varieties.

Ford.

Bilyeu has been thought partly sterile to its own pollen, and the Ford has been planted in commercial orchards in the Potomac Valley section of West Virginia as a pollinizer for the Bilyeu. However, in many orchards the Bilyeu is productive when planted in blocks by itself, and it is doubtful whether another variety is needed to pollinate it.

Ford is a white-fleshed freestone peach of medium size which ripens at about the same time as the Smock. It is liked for canning, but is not liked as well for commercial orchards as other varieties of its season.

Geary.

The Geary ripens with the Smock, but is larger and somewhat poorer colored on chert soils in the Potomac Valley section of West Virginia. It is not likely to become an important variety, although at some places on chert soils it is liked better than the Smock. It is a yellow freestone variety.

Greensboro.

The Greensboro peach is a white-fleshed freestone, highly colored, and of good dessert quality for an early sort. It is inclined to soften on the suture ridge before it is ready to pick. It is considered the best very early peach for all regions of this area when an early sort, ripening nearly three weeks before the Carmen, is desired. The buds of the Greensboro are very hardy, and it blooms later than most varieties. For this reason it is one of the most reliable bearers.

Orchards in which the Greensboro is grown are found in various places in this area. Most of these supply local markets. It ripens too early to be of value for commercial orchards which supply the general market, because the Elberta crop in Georgia and other Southern States furnishes the more popular yellow-fleshed peaches at its ripening season. In the Gulf Coastal Plains region in Tennessee it is occasionally found in commercial orchards.

Heath. Synonyms: *Heath Cling, White Heath, White Heath Cling.*

The Heath is probably the most widely grown of all clingstone varieties in this area. In the markets of Baltimore, Washington, and Richmond, as well as to some extent in other markets, a clingstone peach is wanted for home use in pickling and canning, and small blocks of the Heath are grown in northern West Virginia and in the other parts of this area to supply this trade. The fruit varies greatly in size and quality with the different seasons, soils, and other conditions under which it is grown. The higher altitudes seem better suited to it than the lower levels. Under ideal conditions it is very large, highly colored, considered very good in dessert quality by those who like a clingstone, and one of the best for use in home canning. It is white fleshed and ripens after the Salwey.

Hiley.

The Hiley is grown in a few orchards in the Potomac Valley section of West Virginia, where it ripens between Carmen and the Champion. The fruit is somewhat similar to the Belle, but it is firmer and more highly colored and the suture ridge is very prominent, projecting above the opposite side. It is a white-fleshed freestone, very highly colored, and is the firmest of the early varieties. Its future in this area is doubtful, as it is not always a good bearer. It has a good record in Georgia and at some places in the tidewater section of Maryland and should be thoroughly tested in this area.

Late Crawford.

The Late Crawford is a yellow-fleshed handsome freestone variety ripening just after the Elberta and is considered one of the best varieties of its season in this area. The Chairs is the other standard variety for this season, but is not so widely grown as the Late Crawford. The fruit is large, has a highly colored cheek, is good in dessert quality, and is regarded as a good shipping variety. The trees, however, are not very productive. Like other late varieties in this area it is grown very little except in West Virginia.

Lemon Free.

In the northern Panhandle of West Virginia the Lemon Free is considered the best variety of its season for home use and local markets. It is of excellent dessert quality and has a yellow flesh which separates from the pit and skin better than most varieties. For this reason it is especially desirable for canning. It is not often grown in large commercial orchards, as the fruit is unattractive and does not ship well, but for the season just after Late Crawford may be profitable when grown for canning.

Levy.

The yellow clingstone Levy peach is not so popular as the white-fleshed Heath, which ripens at the same time. The reason seems to be that the fruit sometimes is very small, and it is very susceptible to brown-rot. It was found only in orchards of the Potomac Valley section of West Virginia and is there considered better adapted to the mountain soils than to the lower altitudes.

McCollister.

The McCollister is a large yellow-fleshed freestone peach and is considered a good shipping variety. It ripens with the Edgemont and about the same season as the Stevens and Fox. In some orchards it is the standard variety for the period between Late Crawford and Smock. In one orchard on chert soil it had not borne well, but usually it is considered productive. One desirable feature of the McCollister is its habit of holding its fruit on the tree after ripening better than most varieties.

Minnie. Synonym: *Alton.*

The Minnie is a very large, white-fleshed, semifreestone soft peach of high dessert quality, ripening with the Carman. It blossoms early, and the trees are not very productive. Near Louisville, Ky., it is considered desirable for home use or local market only and is grown very little elsewhere in this area.

Salwey.

The Salwey is the standard variety of its season in all this area. It usually is ready to harvest immediately after the Smock and is all picked several days before Bilyeu ripens. The fruit is medium sized, well colored, yellow fleshed, freestone, and only fair in dessert quality. It is, however, the best freestone dessert and canning variety of its season. In the Potomac Valley section it is planted on both chert and shale soils and is considered desirable on both. It is considered especially adapted to the higher altitudes having good atmospheric drainage, but spraying enables this and other varieties to be grown on low elevations or where air drainage is poor.

Smock.

The Smock is being replaced throughout the area by the Beers Smock, which matures slightly earlier and is larger. In other characteristics the two varieties are very similar.

Stevens. Synonym: *Stevens Rareripe.*

The Stevens is a white-fleshed, handsome freestone peach which is still grown widely by orchardists in the Potomac Valley section because of its high dessert quality. Some growers prefer it to the Late Crawford, which overlaps it in season, although slightly earlier. Other varieties ripening with it are McCollister and Edgemont among the yellow-fleshed varieties and Fox, a white-fleshed sort. Its future in this area will depend largely on whether yellow varieties are to be grown for the general markets to the exclusion of the white-fleshed ones.

VARIETIES OTHER THAN COMMERCIAL.

Many other varieties which have been grown in this area and found undesirable for general planting may be adapted to the local markets or to home use. Some of these varieties are here listed and the reasons given why they are not considered profitable for the general market. Three of these varieties, however, Illinois, Krummel, and Motlow, are considered worthy of trial.

Alexander.

White-fleshed, semicling, small, rather unproductive, and too early in this area for general markets the Alexander peach is considered desirable for home use, as it is an early variety with a vigorous hardy tree, ripening about 30 days before Elberta, just after the Sneed.

Connett. Synonyms: *Southern, Southern Early.*

The Connett is a large white-fleshed freestone variety, but a rather shy bearer, ripening about the season of the more popular Carman, by which it has been replaced.

Crosby.

The Crosby is a yellow-fleshed freestone, ripening with the McCollister, and not adapted to poor soils. Trees of this variety were destroyed by a commercial grower at Knoxville, Tenn., because they were unprofitable, as the fruit is small and unattractive.

Fitzgerald.

The Fitzgerald is a yellow-fleshed freestone, very similar to Early Crawford, but slightly earlier. Its fruit buds are not sufficiently hardy, and it is regarded as undesirable in the Potomac Valley section of West Virginia.

Fox.

The Fox peach is a white-fleshed freestone, ripening with the yellow-fleshed McCollister and slightly later than Edgemont. It is still grown in West Virginia to a considerable extent, though yellow-fleshed sorts are considered more profitable.

Globe.

The Globe peach is a yellow-fleshed freestone, ripening just after Elberta, but not considered so desirable as Late Crawford; is not very productive, and the tree is tender; succeeds best on heavy soil at lower altitudes.

Gold Drop.

The Gold Drop peach is a yellow-fleshed freestone, very handsome though not highly colored, and small in size, having excellent flavor and fine-grained flesh. The trees are very productive and hardy, resistant to brown-rot and leaf-curl, and desirable in home orchards.

Illinois.

The Illinois is a white-fleshed freestone peach of nearly the same season as the Champion. It is liked near Keyser, W. Va., on chert soils and near Louisville, Ky. The trees bear at a younger age than the Elberta. Sometimes the foliage is affected by mildew. The fruit is very large, globose, and one of the most highly colored peaches known. It may prove a desirable shipping variety.

Krummel. Synonym: *Krummel's October.*

The Krummel is a yellow-fleshed freestone variety, reported by orchardists as resembling the Salwey very closely, but ripening a little later and having more productive and hardier trees. It may prove of value to those who wish a later variety of the Salwey type.

Motlow.

The Motlow originated in the yard of a Mrs. Motlow, of Winchester, Tenn., in 1898. It came from the stock of a peach tree which was frozen to the ground at that time. There it is considered a desirable yellow-fleshed freestone variety, ripening about a week later than the Elberta.

Mountain Rose.

The Mountain Rose peach is a white-fleshed globose freestone, ripening between Hiley and Champion, but much smaller than Champion. It is not a good shipper, and the trees are unproductive. Has high dessert quality and is desirable for home use.

Oldmixon Free.

The Oldmixon Free peach is a white-fleshed freestone, ripening too near the season of Elberta for the general market. But there is a limited demand for it on account of its high dessert quality and its desirability for home use.

Picquet.

The Picquet peach is a yellow-fleshed freestone, ripening with McCollister, which is reported more productive. Picquet is also reported as subject to brown-rot. It blossoms very late and is not as likely to be caught by frost as many other sorts.

Reeves.

The Reeves peach is a yellow-fleshed handsome freestone, ripening with Belle, but it is not so reliably productive as that variety. It has high dessert quality and is a good home-garden sort.

St. John. Synonym: *Yellow St. John.*

The St. John peach is a yellow-fleshed, rather small, early freestone variety which has not proved to be productive and is not considered as desirable as the Carman of slightly later season. It is one of the highest in dessert quality of early varieties.

Sneed.

The Sneed is a very early white-fleshed freestone variety, which is small and very poor in dessert quality. Its buds are considered very hardy.

Stump.

The Stump peach is a white-fleshed, rather unattractive freestone, soft variety, very similar to Oldmixon Free, which ripens slightly later than the

Elberta, but too near the season of that variety to become valuable for the general market. It has high dessert quality and is desirable for home orchards.

Success.

The Success peach is a freestone and the latest variety of all to ripen, coming in season after the Bilyeu. In the Potomac Valley section of West Virginia it is caught by freezes too frequently to be profitable.

Triumph.

The Triumph peach is an extra-early, unattractive, yellow-fleshed, semicling variety. It ripens too early in this area for the general market, for it competes with Elberta from more southern regions, ripening before the Carman and just after Sneed, and is too poor in dessert quality for home use. It is very subject to brown-rot.

Wheeler.

The Wheeler peach is a yellow-fleshed, late, freestone variety which has not proved as popular as the Salwey of the same season.

Wonderful.

The Wonderful is a yellow-fleshed, rather small, late freestone variety, very similar to Smock, but it has not proved as profitable as the larger Smock, with which it ripens.

PEAR VARIETIES.

Pear orchards are located at many places throughout this area. In no part, however, does pear growing form an important orchard industry or is it regularly profitable. Occasionally large crops are harvested which are sold at good prices. The general experience has been, however, that all varieties are too subject to attacks of pear-blight to be profitable. Young orchards are not often badly damaged, but when the trees begin to bloom the blight becomes severe. As the orchards grow older the trees surviving the earlier attacks of this disease continually decrease in number until the orchards become unprofitable. Pear-blight on apple trees is much worse when pear trees are grown in the same vicinity. Because of these conditions pear growing is being abandoned in this area.

Throughout Tennessee and Kentucky, except in the extreme northern part of the latter State, very few varieties are found, as the blight is more destructive in these regions than farther north. The Kieffer, which is somewhat resistant to the blight, is the principal variety. Two other varieties of the Sand pear hybrid group, the Garber and LeConte, are also grown to some extent. A few trees of the Golden Russet, a pure oriental variety, are found in some orchards. In northern Kentucky and in West Virginia the blight becomes somewhat less severe, and certain varieties in addition to those mentioned above are grown to some extent. The Seckel is perhaps the most important of these.

IMPORTANT VARIETIES OF PEARS.

Garber.

The tree of the Garber variety is affected slightly more than the Kieffer by pear-blight. The fruit is as large as the Kieffer but is rather more juicy and ripens a little earlier. It is frequently planted with the Kieffer as a pollinizer for that variety and ranks second in importance in this area.

Kieffer.

The Kieffer is the most widely distributed variety in this area and is the most resistant to pear-blight of all the commercial pears except the Pineapple pear, which is grown in southern Georgia, Alabama, and Mississippi. In the Gulf Coastal Plain region in Tennessee, however, orchards were seen which had been entirely destroyed by that disease, while in all parts of the area it has repeatedly caused severe damage. When uninjured by this disease the tree is very productive. The fruit is large, often very large, and is very firm. The flesh is rather coarse and gritty, but when picked at the right season and

properly ripened off the tree it becomes a fair dessert pear. Very little of the gritty character of the flesh remains when it is well handled, and it is juicy and desirable for canning and other culinary uses. It is a fall variety in northern Alabama, Tennessee, and southern and western Kentucky, but in cold storage is a winter variety in other parts of the area. In some sections the Kieffer has proved unproductive unless planted with some other variety for cross-pollination. The Garber has been commonly used for this purpose in this area, but is not always as satisfactory as LeConte. To insure cross-pollination one of these sorts should always be used.

Seckel.

The Seckel variety is one of the most blight resistant of the dessert pears. For this reason it is highly prized in the northern part of this area, where the other favorite dessert pears of the North have proved too susceptible to blight. The tree is an early bearer and productive. The fruit is always small, very juicy, and of the best dessert quality. In West Virginia and northern Kentucky it matures in September.

Three W.

About 20 years ago W. W. Wallace, of Roane County, Tenn., planted seeds of pears which were purchased at a local store during the winter. From these seeds he originated the Three W variety, which has remained uninjured in

FIG. 30.—A young pear orchard of the Three W variety at a low elevation in the East Tennessee Valley and Ridge region. Photographed in 1913.

an orchard containing Kieffer pear trees that were killed to the ground by blight. Mr. Wallace has planted this variety commercially. If the trees prove productive and continue to show the same degree of blight resistance as heretofore, the variety would have considerable promise for southern conditions and should be widely tested in the South. The tree is upright and similar in shape to that of the Kieffer. The foliage is somewhat susceptible to leaf-spot. The fruit is medium in size, somewhat smaller than that of Kieffer. It resembles the Kieffer in shape and color and is considered somewhat better in dessert quality. Its season is about the same as that of the Kieffer. Figure 30 shows parts of an orchard of this variety.

VARIETIES OF LESSER IMPORTANCE.

Among other varieties of pears occasionally found in this area are the Bell, which resembles the Kieffer superficially; Bartlett, which is too subject to blight; Cincincis and Dewey, which are both too poor in dessert quality; Golden Russet, which is too small, poor in dessert quality, and subject to blight; Koonce and LeConte, which are too subject to blight and hence not productive. None of these varieties seems to possess sufficient merit to warrant planting them.

PLUMS.

No large orchards of plums are found in this area. Several small ones supplying local markets have been studied; also one orchard near Chattanooga, Tenn., in which the Abundance has proved to be a profitable variety to ship to the general markets, because it ripens before the plums from California come in. With the exception of the Shropshire (damson) and occasionally some variety of the Japanese type, the plums which are succeeding in Kentucky and Tennessee are horticultural varieties of native American species. The Wildgoose, a variety originating in Tennessee, is grown more than any other. Various seedlings of the Wildgoose have proved desirable in some parts of this area. In a collection of nearly 50 varieties near Louisville, Ky., the Wildgoose, Milton (a seedling of the Wildgoose), Newman (belonging to the same species), Golden (supposed to be a hybrid between a variety of the same species and the Abundance), and De Soto (a variety belonging to another American species) are among the most desirable varieties.

In northern West Virginia varieties of European origin seem to be better adapted than they do farther south but are grown in home orchards or for local markets only. Commercial orchards of plums which have been planted in this part of the area have not proved a success.

In this area plums should be planted at present for home use and local markets only. For these purposes in West Virginia at the higher altitudes the European varieties, including the Bradshaw, Moore, Shropshire, Imperial Gage, and Lombard, may be planted. Some native American varieties also succeed. In Kentucky and Tennessee the Golden, Shropshire, and the native varieties succeed best and should be planted in preference to others.

SMALL FRUITS.

The principal small fruit in this area is the strawberry. It is widely grown and forms an important commercial industry. Blackberries and raspberries are also raised to some extent throughout most of the area. The blackberry, however, seems better adapted to all regions in this area than the raspberry, as might be expected, since its wild forms are found in abundance in all sections, while the wild black raspberry is less common and the red raspberry is found only in the higher mountains and in the northern part. Wild forms of the gooseberry and currants are rarely found, and their cultivated forms are likewise grown but very little.

BLACKBERRIES.

The wild forms of the blackberry seem especially adapted to the southern part of the Appalachian Mountain Range. Many of the hillsides from which the timber has been cut and which later may be covered with second-growth trees are first covered with blackberry bushes. Under such conditions the berries grow large and sweet, as the ground is covered with decaying organic matter which retains an abundant moisture supply for the plant and the fruit. At many points in the hills and mountains canneries have been estab-

lished. The berries are picked and sold to the canneries by persons living in the neighborhood. The extent of this industry may be realized from the fact that in 1913 in one county of eastern Tennessee a pack of over one million cans of wild blackberries was reported. As the berries are not as uniform in the degree of ripeness as those from cultivated fields which are picked regularly, the canned product is probably not the equal of that from the cultivated fields.

Because of the abundance of wild berries not alone in the hills, but by roadsides, streams, along fences and in the pastures and waste land of all parts of this area, the cultivated forms are not often found in the gardens or in commercial plantings. In the neighborhood of the larger cities local supplies are grown, and at one place only, Greenfield, Tenn., are large quantities shipped. The variety chiefly planted at Greenfield is the Early Harvest, which is grown because of its early-ripening season and its excellent shipping qualities. Near the larger cities of Tennessee, the Early Harvest, Eldorado, Missouri, and a variety called the Red Cane are grown. In Kentucky, the Eldorado and Early Harvest are the principal varieties, while the Blowers is regarded as a desirable variety, new to this region. In West Virginia the Early Harvest and Eldorado are the standard varieties, with the Blowers reported as promising.

IMPORTANT VARIETIES OF BLACKBERRIES.

Blowers.

The Blowers variety has been tested slightly in Kentucky and West Virginia. Where grown it has proved vigorous and very productive. The fruit ripens in midseason somewhat after the Eldorado, but is susceptible to orange rust while Eldorado is very resistant.

Early Harvest.

The Early Harvest, which ripens its fruit nearly two weeks before any other blackberry grown in this area, is the most profitable variety where early berries are desired. The canes are very erect, very productive, and often show differences of two or three weeks in time of ripening their fruit. Partly for this reason and partly because the fruit on a single cane ripens through a long period, the picking season usually lasts from five to six weeks. The heaviest picking, however, usually occupies about three weeks. At Greenfield, Tenn., in 1913, the first pickings were made about June 5 and regular pickings were still being made on July 13. The greatest fault of this variety is its susceptibility to the orange rust. Because of this it has been supplanted in some places by more resistant varieties. The berries are small, very firm, and sometimes, though not always, good in dessert quality. In this area it is considered one of the best shippers. It is not grown as widely in Kentucky and West Virginia as in the Interior Low Plateau and Gulf Coastal Plains regions in Tennessee. It sometimes winterkills in those States.

Eldorado.

The Eldorado is the leading variety about Knoxville, Tenn., also throughout Kentucky and West Virginia. The canes are vigorous and very productive. It is reported to be the most resistant of standard varieties to the orange rust in this area. The berry is large, firm, sweet, and very good in dessert quality. It begins to ripen about two weeks later than the Early Harvest. Near Louisville, Ky., it is grown for canning and is considered one of the best for this purpose.

Missouri. Synonym: *Missouri Mammoth.*

The Missouri variety is grown slightly about Nashville, Tenn., where it ripens during the last week in June and the first week in July. The canes are subject to orange rust. The berries are globose, large, sweet, and have large seeds. It is not as desirable as the Eldorado where that variety does well.

Red Cane.

A variety known locally as the Red Cane is being grown in the section immediately surrounding Nashville, Tenn. It was reported to have been found growing wild in a field near Antioch, Tenn., by J. R. Savage. The name is derived from the color of its canes. These are tall, vigorous, and productive, and very little of the orange rust or double-blossom disease has been found on them. The berry ripens among the latest of any, beginning about the second week in July at Antioch. It is large, oblong, firm, and sweeter and better flavored than the fruit of the Missouri.

Snyder.

The Snyder variety, which is the standard berry of northern regions, is grown very little in any part of this area. In Tennessee and Kentucky, so far as observed, it is less productive and less desirable in other respects than Early Harvest and Eldorado. In West Virginia it is grown very little and is probably not as desirable as other varieties for growing in the different regions of that State.

Wilson Junior.

Though grown in the Gulf Coastal Plains region of Tennessee, the Wilson Junior is not as popular there as the Early Harvest, which ripens earlier and through a longer period. Its principal fault is its susceptibility to winter injury. The orange rust does not affect it seriously in this region, having been readily controlled by destroying affected plants which might spread the disease. The canes are vigorous and productive, and the fruit is large, fairly firm, sweet, and very good in dessert quality.

CURRANTS.

Very few currants are grown in this area. One reason for this seems to be that when the foliage is not sprayed a leaf-spot disease frequently causes all the leaves to fall during the summer. The bushes are not as vigorous and not as productive as in northern regions, where the foliage usually is retained until late fall. The London, Red Cross, Red Dutch, and Pomona varieties have been observed to hold their leaves better than many others and should be more satisfactory for this reason. No currants were seen in any region of Tennessee, though formerly near Chattanooga the North Star was grown. It was the only variety tested that proved successful there. In Kentucky several varieties were seen, the London and Red Cross being among the most desirable. At Morgantown, W.Va., the Fay, Victoria, and White Grape varieties were considered the best. At another point in northern West Virginia the Perfection, Cherry, and Wilder were considered desirable. London and Red Cross are likely to prove valuable in West Virginia as well as in Kentucky.

DEWBERRIES.

The culture of dewberries in this area is very restricted. In the East Tennessee Valley region at Knoxville, Tenn., the Mayes (*Austin Mayes*) and the Lucretia are grown, while about Louisville and Covington, Ky., the Lucretia only is grown. The latter variety seems to be the more desirable. Its berries are large, oblong, and firm enough for shipping, while the fruit of the Mayes is large, nearly globose, and too soft for distant markets. It is, however, sweeter and ripens earlier than the Lucretia, and the yields of fruit per acre are somewhat larger. Because the dewberry ripens before the wild blackberries it is likely to be profitable in this area when given proper treatment.

GOOSEBERRIES.

The gooseberry in this area, as well as in the North, is not as popular as the other small fruits, and very few plantations exist. In Hardin and Jefferson Counties in Kentucky, however, the Downing is grown to some extent. It is liked and is usually profitable in those counties. Near Chattanooga, Tenn., the Downing has also been grown successfully. In West Virginia very few gooseberry plants were seen, and these were of the Downing and Houghton varieties. The Downing seems to be the most desirable in all regions of this area where they are grown at the present time.

RASPBERRIES.

Occasionally in Tennessee and more frequently in Kentucky and West Virginia commercial plantations of raspberries have been observed, chiefly of the red and black varieties. Where proper care has been given the fields, varieties adapted to conditions have been selected, and the plants have been free from crown-gall and mosaic diseases, they have been profitable. In the East Tennessee Valley region the Cuthbert is one of the principal varieties; in the Interior Low Plateau region in Tennessee the Loudon; and in the Gulf Coastal Plains region, the King red raspberry and the Cardinal purple raspberry are profitable. In the Interior Low Plateau region in Kentucky, the King and Cuthbert have proved to be the best red varieties, and the Cumberland, Kansas, Farmer, and Gregg are the leading black raspberries.

VARIETIES OF RASPBERRIES STUDIED IN THIS AREA.

Cardinal.

The Cardinal is a purple-cane variety which has proved to be one of the hardiest under the changing winter temperatures of the Interior Low Plateau and Gulf Coastal Plains regions and is the most desirable purple raspberry grown at present in these regions. The canes are vigorous, hardy, very resistant to San Jose scale (which is sometimes serious on raspberries in this section), and very productive. The berry is large, purple in color, and rather soft. If the Royal, hardy in the Northern States, proves hardy under winter conditions and otherwise well adapted to this area it will probably supplant the Cardinal, as the fruit of the Royal is firm and therefore better for shipping.

Cumberland.

Although usually hardy in this area and one of the most desirable black varieties, the Cumberland winterkills in the Gulf Coastal Plains region of Kentucky. In some other sections of Kentucky it is reported as the best black raspberry. The canes are vigorous and productive, but subject to anthracnose, curly-leaf, and blue-stem. The fruit is large and of good dessert quality. Its season is early.

Cuthbert.

About Knoxville, Tenn., the Cuthbert is the leading red raspberry. It is grown to some extent in other parts of this area, but the King seems generally better adapted to those sections. The Cuthbert has been grown slightly in Alabama, but it is not as productive there as the purple sorts are. The canes are vigorous, long, and productive. Though usually hardy, they are less so than the canes of the Loudon. The berry is large, rather conical, dark red, and high in dessert quality. Its season is later than that of the King, with which it is frequently grown. Figure 31 shows a field of the Cuthbert raspberry near Knoxville, Tenn.

Farmer. Synonym: *Plum Farmer.*

The Farmer is an early black-cap variety which has proved valuable in northern regions where it and Cumberland hve largely replaced all other

black sorts. It has not been reported to equal the Cumberland where tried in this area and is grown but very little.

Kansas.

The Kansas is likewise an early black-cap variety grown but little in this area. Where grown it is liked, as the berries continue large in size to the end of the season.

King.

The King is generally reported in this area as one of the best red raspberries. In the Gulf Coastal Plains region near the Mississippi River it is grown for the earliest markets and is considered the most satisfactory of any variety for that purpose. In Kentucky and West Virginia it is also well liked and is the most popular red raspberry. The canes are vigorous, but do not grow very high, though they are hardy and productive. The berries ripen through a long season.

Loudon.

In the East Tennessee Valley region and in that part of the Interior Low Plateau region which is in Tennessee the Loudon is considered the hardiest red raspberry. In the same sections where Cuthbert and others have been badly winterkilled, it has not been injured. Its chief fault is that it is not as productive as many other sorts. The canes are tall, comparatively few in

FIG. 31.—A field of Cuthbert raspberries near Knoxville, Tenn. Note that the rows run with the contour of the hill.

number, very healthy, but break easily. The berry is dark red, firm, with the seeds somewhat conspicuous, and is of excellent dessert quality. The berries turn red before being easy to separate from the receptacle, and because of this they have the reputation of being hard to pick. The berries ripen late.

Marlboro.

The Marlboro is being grown very little in this area. The King, which ripens at about the same season, is considered better and is grown instead. At one place in West Virginia it is reported as tender.

Miller.

The Miller red variety has uniformly been so badly affected by crown-gall and so unproductive that it is being discarded.

Ranere. Synonym: *St. Regis.*

The Ranere, widely disseminated under the name St. Regis, is an early red variety extensively cultivated for many years on the sandy soils of central New Jersey, so far being the only commercial raspberry entirely free from mosaic diseases. In that State approximately five-sixths of the total crop is borne at the usual time on the older canes and one-sixth on the new canes during late summer and fall. On the clay soil of the Interior Low Plateau region of Kentucky it has been unproductive in the fall. On somewhat lighter soil near Louisville it has been more productive. In the East Tennessee Valley

region it has also been productive and is considered desirable. If the young canes of the Ranere are to be productive in the fall they must have a good moisture supply throughout the summer. It is not recommended for this area except for trial.

Syracuse.

The Syracuse is a large-fruited red raspberry of the European type which has winterkilled to the ground near Knoxville, Tenn. It is not now being grown in this area.

STRAWBERRIES.

The strawberry crop is the leading commercial fruit crop of Tennessee and one of the most important commercial fruit crops of Kentucky. In West Virginia it is relatively unimportant, the apple and peach constituting the important fruit industries of that State.

The more important sections of Tennessee for strawberry growing are in the Gulf Coastal Plains region and near the Tennessee River from Chattanooga to Knoxville in the East Tennessee Valley region. The shipping season in that State usually starts during the first week in May and continues with the later varieties until about June 1. In each of the years 1914 and 1921 the shipments from Tennessee exceeded 1,500 cars of berries. The Klondike is the leading variety grown, and in the Gulf Coastal Plains region it is planted almost exclusively. The Aroma, Gandy, and Thompson are the other important varieties. In the northern part of the Gulf Coastal Plains region in Tennessee the Excelsior and Gandy are raised, but the acreage of these is not large. About Nashville the Gandy is the principal variety. In the East Tennessee Valley region, the Aroma is the most important variety about Lancing, Knoxville, and Maryville, while the Klondike, Gandy, Thompson, and Aroma are grown farther south, toward Chattanooga.

In Kentucky the berry sections are located in the vicinity of the cities of Bowling Green, Louisville, Pembroke, and Covington. About Bowling Green the Aroma is the leading variety, while the Klondike and Gandy are grown to a slight extent. The greater part of the berry crop near Louisville is used to supply the local markets, and berries grown in the vicinity of Covington go to the Cincinnati markets. The berries that supply these cities are, for the most part, hauled to the city markets by the growers. Because of this it is not necessary that berries grown near Louisville and Covington shall stand long-distance shipping, and many different varieties are planted to a greater or less extent.

Near Louisville in recent years the supply has been larger than the city markets needed. In consequence, berries have been shipped from Middletown and other points about Louisville to more distant markets. With railroad shipments under way the conditions changed. Carload lots of a single firm variety can be sold to much better advantage than a mixed car of varieties that vary in shipping qualities, and it became essential that fewer varieties be raised for shipping. The Aroma has become the leading variety for shipping, while the Gandy, Bubach, Dunlap, Klondike, Haverland, Sample, Chesapeake, Warfield, Climax, Ozark, St. Louis, Helen Davis, Champion, Ekey, and others are grown by those supplying the Louisville market.

In West Virginia strawberries are raised to supply local markets, and no distinct strawberry sections exist. The Gandy, Dun-

lap, Sample, Belt, Haverland, and Aroma are grown chiefly. At the higher altitudes in West Virginia the Sample or Belt is frequently grown, while the Aroma is rarely found.

VARIETIES OF STRAWBERRIES STUDIED IN THIS AREA.

Aroma.

The Aroma is one of the leading varieties grown in the Ozark region of Missouri and Arkansas as well as in this area. It is best adapted to moderately heavy soil types such as the Clarksville silt loam which is found about Bowling Green, Ky. On such soils it is very productive, while on heavy clay soils the Gandy usually outyields it. The plants do not make much foliage, but when the soil contains plenty of humus the leaf growth is sufficient. In this area its foliage is one of the least susceptible of any variety to leaf-spot. The fruit is large, uniform in shape and size, and is one of the firmest strawberries grown in the United States. It has an attractive red color and is high in dessert quality. Figure 32 shows a good field of this variety and Figure 33 a crate of the fruit.

FIG. 32.—A typical field of Aroma strawberries at Bowling Green, Ky., in the Interior Low Plateau region.

Belt. Synonym: *William Belt.*

The Belt is one of the leading varieties in the northern part of the United States. In northern West Virginia it is grown to some extent and is well liked. The berry is large, deep red in color, and ranks high in dessert quality. Its season is late. Its foliage is too subject to leaf-spot to make it a leading variety.

Bubach.

The Bubach is grown to some extent about the larger cities of Kentucky and Tennessee for the local market. It is very productive on the heavier types of soil. The berry is large, of a good red color, of good dessert quality, but is too soft for shipping and not very uniform in shape. It is being supplanted by firmer varieties. The Dunlap is frequently used as a pollinizer for the Bubach, as the flowers of the latter are imperfect.

Champ Clark. Synonym: *Tibbs Early.*

In 1896 D. A. Tibbs, of Davidson County, Tenn., threw out of his packing shed decaying berries of the Bubach, Haverland, and Michel, which he was raising at that time. The following year, from the mass of seedlings that grew, he set out 200 plants. All but 30 of these were soon discarded. These 30 he grew for two years and then saved two varieties, one of which he first called Tibbs Early and later Champ Clark. This he began disseminating in 1910, chiefly in Davidson County, Tenn.

It is a good plant maker, and its foliage is abundant. The berries are long conic, without white tips, medium to large in size, attractive color, firm for shipping, good to very good in dessert quality. Its season is early, about the same as the Excelsior and Michel, beginning to ripen about May 1 at the place of origin. It seems to be of some value in Davidson County, Tenn.

Chesapeake.

The Chesapeake has not been observed at many places in this area. Near Louisville, Ky., on heavy clay soil which is especially adapted to the Gandy, it has been fairly productive, and the berries have brought the highest prices of any on the local market. However, the Gandy brought nearly as high prices, and its yields under similar conditions were nearly twice those of the Chesapeake. At other points no better reports were obtained. Its chief fault is that it does not make sufficient plants on most soils and it is not as profitable as other varieties. The berries are among the most uniform in form and size of any well-known variety. They are of excellent dessert quality, firm for shipping, and very attractive in appearance. It is one of the most desirable for the home garden and for use under the hill system of training on rich soils

FIG. 33.—A crate of Aroma strawberries. When given proper cultivation the whole crop will be of the best grade in sections to which this variety is adapted. Photographed at Bowling Green, Ky.

in the northern part of this area. In New Jersey it is considered a desirable variety under overhead irrigation.

Dunlap. Synonym: *Senator Dunlap.*

The Dunlap, which is the leading variety in most of the west North-Central States, is chiefly adapted to the local markets in this area. It is grown to some extent about Louisville, Ky., and in West Virginia, but it is too soft for shipping and in many places is small. Because of its productiveness and its healthy foliage, it will probably continue to be grown for the local markets.

Ekey.

The Ekey variety is grown to some extent about Louisville, Ky., but is being replaced by better ones. It is usually productive, and the berries are large, long, somewhat irregular, and not firm enough for the general market.

Excelsior.

The Excelsior is grown to a slight extent throughout the entire eastern portion of the United States from Texas to New England. It is one of the most widely adapted varieties grown. In no place does it form a large part of the shipments from a section, but it is used as an early variety before the main crop ripens. In this area it is often used for local markets as a companion to the Klondike, for it ripens several days earlier than that variety. When the

Klondike begins to ripen, growers usually stop picking the Excelsior, even though its season is not over, since its berries are so much smaller than those of the Klondike. The berries are globose, small except under very favorable conditions, dark-red color, and quite acid. Its foliage is subject to attacks of leaf-spot. It will probably be supplanted for local markets by the Howard 17, which ripens at about the same season, but holds up in size longer and is far more productive in places where it has been tested.

Gandy.

The Gandy is the standard late variety for much of this area, although its acreage is comparatively small. The reason for this is that in commercial fields only one variety is desirable, in order that carload lots of a single variety may be shipped. As the Klondike and Aroma are more productive on most soils in Kentucky and Tennessee and as they fit into the season in which strawberries can be shipped to the best advantage, they are chiefly grown. In some sections when the Klondike berries begin to be small near the end of the picking season growers like to have a small field of the Gandy. The pickers will stay to the end of the season to pick the large berries of the Gandy and will thus pick the Klondike fields later than they otherwise would. They are able also to pick to a more uniform standard of size under such conditions.

FIG. 34.—A good field of Gandy strawberries near Parkersburg, W. Va., in the Allegheny Plateau region. Note the straw mulch between the rows.

In the Gulf Coastal Plains region in Tennessee where cotton is raised the Gandy is not as popular as it otherwise might be, because pickers are often needed to work in the cotton fields before all the Gandy crop is harvested. Near Louisville, Ky., on heavy clay soil it has proved more productive than the Aroma. In all regions of West Virginia it is the leading late variety. Figure 34 shows a good field in this State.

The plant is vigorous, productive, and seems especially adapted to clay soils. Its root system is reported as somewhat shallow. Its foliage is abundant, quite susceptible to leaf-spot, and sometimes mildews. The fruit is borne on erect, stiff stems which keep the fruit off the ground better than many varieties. The berries are large, rather irregular, deep red, subacid, and very good in dessert quality. Because of its acidity and color it is liked for canning.

Hathaway. Synonym: *Texas.*

Though grown in both Tennessee and Kentucky the Hathaway variety has not been observed enough to make possible an estimate of its value. It is a good plant maker and is productive. The berry is attractively colored and its season is early. It was liked near Spring City, Tenn., and near Lexington, Ky., yet it is not generally grown. It is interesting to note that the Hathaway shows some fall-bearing tendencies.

Haverland.

The old Haverland variety is grown to some extent about the larger cities of the area for the local markets. It is one of the most productive and is adapted to a wide range of soils. On clay soils it is especially productive. The berries are large, very long, light colored, and one of the softest, making it entirely unfit for shipping. In rainy seasons the berries may be too soft even for the local market. On nearly every soil type, and probably on every soil type, in this area at least, other varieties will be found which are as productive and which are firmer and of better color. As its flowers are imperfect the Dunlap is often used as a pollinizer.

Klondike.

In nearly all southern strawberry-growing regions of the United States the Klondike is the leading commercial berry, and in the southern part of this area also it is the principal variety. In the Gulf Coastal Plains region in Tennessee it forms about 95 per cent of the total acreage in strawberries. In the East Tennessee Valley region about Chattanooga it is the principal variety and is an important variety in the whole region. About Bowling Green it forms only about 4 per cent of the total acreage. Elsewhere in Kentucky it is grown very little and in West Virginia it is not raised.

Its foliage starts into growth in the spring earlier than does that of the Aroma, and at the picking season the leaves are very much larger and more abundant. The foliage is more susceptible to leaf-spot than that of the Aroma. The average yield of the Klondike in the Gulf Coastal Plains region in Tennessee from fields receiving good treatment is about 100 crates of 24 quarts each for the first season after planting.

The berries are large, globose, dark red when fully ripe, and rather acid. It is one of the best shipping berries grown at present. Its brisk acid flavor and attractive red color makes it very desirable for both dessert use and canning. When canned it holds its color better than most varieties. It is adapted to practically all types of soils which are fertile. In some sections it is grown on coarse sandy soils, in others on gravels, silts, and clays. Soils containing large quantities of nitrogen should be avoided. In the Gulf Coastal Plains region in Tennessee nearly all the soils on which the Klondike is grown are silt loams, while in the East Tennessee Valley region the berry fields are found on gravel, sandy, and clay loams. At present no other variety is supplanting the Klondike in any of the sections where it is grown.

Michel. Synonyms: *Michel's Early, Mitchel's Early.*

The Michel variety is grown to a slight extent in Tennessee and still less in Kentucky. It ripens very early and is reported to yield less and not hold up as well when shipped as the Excelsior, which ripens at the same time.

Miner. Synonym: *Miner's Great Prolific.*

The Miner variety is reported to have originated on the place of a Mr. Southern at Shinnston, W. Va., about 1892. It has been distributed in the section about Shinnston and is liked by the growers there. It is not grown elsewhere.

Missionary.

The Missionary variety has been tested in Tennessee as well as in most other strawberry-growing sections where the Klondike succeeds. It ripens very nearly with the Klondike, but does not seem to be better than that variety in this area and sometimes runs smaller in size. Reports so far do not indicate that this is a desirable variety for this area.

Ozark. Synonym: *Early Ozark.*

The Ozark has been tested in the hope that it might prove a desirable variety earlier than the Klondike. However, it has not always been a good plant maker, and the berries have lacked uniformity in size. The plants are productive and the foliage fairly healthy. The berries are medium in size, globose, darker in color than the Klondike, and similar to it in quality. It needs further testing to determine its value.

Ruth.

The Ruth is one of the several varieties originated by J. W. Swinney, of Greenfield, Tenn. Seeds of the Klondike from a field near which the Thompson was growing were planted by Mr. Swinney in 1903 or 1904 in his garden. Only a few plants were raised, one of which was named Ruth.

The Ruth is a good plant maker. Its foliage is vigorous and a lighter green than that of the Klondike. It is reported to be more productive than the

Klondike the first year, but about the same the second year. The berry is similar in shape and color to the Klondike, but is much less acid. Its quality is good, and it ripens about three days earlier than the Klondike, is said to be slightly less firm, but is shipped regularly. It has not been sufficiently tested as yet to determine its value.

St. Louis.

The St. Louis variety was found at various places in Tennessee and Kentucky. Although the plants are productive, the berries large, of good color and flavor, and ripen with the Klondike, they are much softer than that variety. Because of this they are not as desirable for market purposes as the Klondike.

Swinney.

The Swinney variety, earlier than Ruth, originated by J. W. Swinney, was called *Swinney's Choice*. This is a seedling of the Louise (grown by the originator about 1893 when he lived at Trezevant, Tenn.). The Swinney has been little disseminated.

Tennessee. Synonym: *Tennessee Prolific.*

Plants of the Tennessee variety were found near the home of Captain Hodge, of Morrisville, Tenn. It is not grown to any considerable extent in this area, but it is one of the principal varieties grown for the local market about Washington, D. C. It is of the Klondike type, very productive, a good plant maker, and is considered a good pollinizer for other varieties. The berries are medium in size, somewhat pointed, deep attractive red in color, of good dessert quality, but rather soft. It is chiefly adapted to local market trade.

Thompson. Synonym: *Lady Thompson.*

The Thompson variety ripens at the same time as the Klondike and is being gradually replaced in this area, as in other parts of the South, by the Klondike and other better varieties. A considerable acreage of it is still found in the southern part of the East Tennessee Valley region where it is reported as more productive than the Klondike. The berries, however, are lighter colored and much less acid and because of this usually bring from 15 to 50 cents less per crate than the Klondike.

Three W.

In the spring of 1901 W. W. Wallace, of Harriman, Tenn., found a bed of 19 strawberry plants all of the same variety growing by the Northeastern railroad track inside the corporate limits of Harriman. These were noticeable because of the flowers and large healthy foliage. Mr. Wallace took the plants home, put them in a seed bed, and tried to obtain some fruit that year. After losing four plants, the fruit was pulled off the remainder. From the 15 plants 600 were raised the first year. The variety seemed valuable and was propagated and disseminated throughout the United States, although in no place has it become a prominent variety.

The plants are very productive on the gravel loam soil on Mr. Wallace's place. Many plants are produced the first year after a field is set. Thereafter but few are produced. Their strong root system enables them to withstand drought better than most varieties. The foliage is vigorous. The berries are very large, quite uniform, sometimes becoming cockscombed, and of attractive red color. The flavor and quality are good. Why it has not become more popular is uncertain, as it appears to be very desirable where first grown. One point of interest, if not of value, is that under favorable conditions at Harriman it has produced a small second crop of berries about two months after the first crop.

FRUIT VARIETY LISTS FOR EACH REGION.

In order to summarize the information presented in the preceding pages, the lists that follow have been compiled. The reason why a certain variety is placed in any list may be determined by referring to the characterization of that variety, and growers should use these lists only in connection with the characterizations. When alternate varieties are listed for any particular season, the variety first listed is considered more desirable. For the Cumberland Plateau region the same lists that are given for the Interior Low Plateau region should be used.

Two varieties of cherries, the Early Richmond and the Montmorency, are recommended for planting for commercial orchards and home use in the regions of this area.

No pear varieties for commercial orchards are recommended for the regions of this area. (See "Pear varieties, p. 62.)

TABLE 6.—*Apple varieties recommended for the several pomological regions, listed in the order of their seasons of ripening.*

RECOMMENDED FOR PLANTING IN COMMERCIAL ORCHARDS.

Virginia Valley and Ridge region.	Allegheny Plateau region.	East Tennessee Valley region.	Interior Low Plateau region.	Gulf Coastal Plains region.
Yellow Transparent.	Yellow Transparent.	Yellow Transparent.	Early Ripe.	Early Ripe.
Early Ripe.	Early Ripe.	Early Ripe.	Oldenburg.	Oldenburg.
Oldenburg.	Oldenburg.	Oldenburg.	Fanny.	Fanny.
Wealthy.	Wealthy.	Fanny or Williams.	Wealthy.	Wealthy.
Maiden Blush.	Maiden Blush.	Wealthy.	Maiden Blush.	Maiden Blush.
Jonathan.	Jonathan.	Summer Rambo.	Jonathan.	Delicious.
Delicious.	Delicious.	Maiden Blush.	Delicious.	Kinnard.
Grimes Golden.	Grimes Golden.	Jonathan.	Grimes Golden.	Stayman Winesap.
Stayman Winesap.	Stayman Winesap.	Delicious or Virginia Beauty.	Kinnard.	Winesap.
York Imperial.	Rome Beauty or York Imperial.	Kinnard.	Stayman Winesap.	Arkansas.
Arkansas.	Arkansas.	Stayman Winesap.	Arkansas.	
		Winesap.		
		Arkansas.		

RECOMMENDED FOR TESTING IN COMMERCIAL ORCHARDS.

Marks of parenthesis are used to distinguish certain varieties which ripen at about the same time as those whose names immediately precede them, thus serving as a guide in this respect.]

Livland Raspberry (Yellow Transparent).	Livland Raspberry.	Coffman (Early Ripe).	Coffman.	Coffman.
Fanny (Williams).	Fanny.	Summer Rambo.	Mountain June (Red June).	Mountain June.
Summer Rambo (Wealthy).	Summer Rambo.	Chicago.	Champlain (Fanny).	Champlain (Fanny).
Mother (Delicious).	Mother.	Akin.	Williams (Fanny).	Williams.
Lowry (Delicious).	Lowry.	Crosky (Arkansas).	Summer Rambo.	Summer Rambo.
Virginia Beauty (Delicious)	Virginia Beauty.		Eades (Wealthy).	Eades.
Chicago (Stayman Winesap).	Ensee (Delicious).		McCrosky (Arkansas).	McCrosky (Arkansas).
Kinnard (Stayman Winesap).	Chicago.			Springdale (Arkansas).
Akin (Stayman Winesap.)	Kinnard.			
Loy (Winesap).	Akin.			
Cannon Pearmain (Arkansas).	Loy.			
	Cannon Pearmain.			

RECOMMENDED FOR HOME USE AND LOCAL MARKET.

[Varieties in italic are considered most desirable.]

Yellow Transparent.	Yellow Transparent.	Yellow Transparent.	Yellow Transparent.	Yellow Transparent.
Early Harvest.	Early Harvest.	Early Harvest.	Early Harvest.	Early Harvest.
Early Ripe.	*Early Ripe.*	*Early Ripe.*	*Early Ripe.*	*Early Ripe.*
Livland Raspberry.	Livland Raspberry.	Livland Raspberry.[1]	*Coffman.*	Thompson June.
Red Astrachan.	*Oldenburg.*	*Oldenburg.*	*Oldenburg.*	*Coffman.*
Oldenburg.	Chenango.	Chenango.	Chenango.	*Oldenburg.*
Chenango.	*Williams.*	*Williams.*	Williams.	Chenango.
Williams.	*Chenango.*	*Fanny.*	*Champlain.*	Williams.
Fanny.	*Williams.*	Jefferis.	*Fanny.*	Champlain.
Jefferis.	Fanny.	*Wealthy.*	Jefferis.	*Fanny.*
Wealthy.	*Jefferis.*	Gravenstein.	*Wealthy.*	Jefferis.
Gravenstein.	*Wealthy.*	*Summer Rambo.*	*Gravenstein.*	*Wealthy.*
Summer Rambo.	*Gravenstein.*	*Maiden Blush.*	*Summer Rambo.*	Gravenstein.
Maiden Blush.	*Summer Rambo.*	Claiborne.	*Eades.*	Eades.
Benoni.	*Maiden Blush.*	Benoni.	*Maiden Blush.*	*Maiden Blush.*
Celestia.	Benoni.	Celestia.	Benoni.	Benoni.
Smokehouse.	*Celestia.*	Fall Pippin.	Celestia.	*Fall Beauty.*
Fall Pippin.	Fall Wine.	*Virginia Beauty.*	Fall Pippin.	*Banana.*

[1] Desirable only in the northeastern part of the East Tennessee Valley region.

TABLE 6.—*Apple varieties recommended, etc.*—Continued.

RECOMMENDED FOR HOME USE AND LOCAL MARKET—Continued.

Virginia Valley and Ridge region.	Allegheny Plateau region.	East Tennessee Valley region.	Interior Low Plateau region.	Gulf Coastal Plains region.
Mother.	Golden Gate.	Banana.	Grosh.	King David.
Lowry.	*Smokehouse.*	King David.	*Banana.*	*Jonathan.*
Virginia Beauty.	Fall Pippin.	*Jonathan.*	Rambo.[1]	*Delicious.*
Banana.	*Mother.*	*Delicious.*	King David.	*Kinnard.*
Rambo.	Lowry.	Chicago.	*Jonathan.*	*Stayman Winesap.*
King David.	*Virginia Beauty.*	*Grimes Golden.*	*Delicious.*	*Winesap.*
Jonathan.	Northern Spy.	*Kinnard.*	*Grimes Golden.*	*Arkansas.*
Delicious.	*Banana.*	*Stayman Winesap.*	*Kinnard.*	*Springdale.*
Chicago.	*Rambo.*	Akin.	*Stayman Winesap.*	*Mc Crosky.*
Grimes Golden.	Wagener.	*Winesap.*	Akin.[1]	*Yates.*
Oliver.	*King David.*	*Arkansas.*	*Winesap.*	
Baldwin.	*Jonathan.*	*Mc Crosky.*	*Arkansas.*	
Stayman Winesap.	*Delicious.*	Yates.[2]	*Mc Crosky.*[3]	
Akin.	*Chicago.*		Yates.[3]	
Loy.	*Grimes Golden.*			
Arkansas.	Oliver.			
	Baldwin.[4]			
	Stayman Winesap.			
	Akin.			
	Arkansas.			
SWEET VARIETIES.	SWEET VARIETIES.	SWEET VARIETIES.	SWEET VARIETIES.	SWEET VARIETIES.
Sweet Bough.	*Sweet Bough.*	*Sweet Bough.*	*Sweet Bough.*	*Sweet Bough.*
Bailey.	*Bailey.*	*Archibald.*	Bailey.	*Pumpkin Sweet.*
Broadwell.	*Broadwell.*	*Broadwell.*	*Pumpkin Sweet.*	*Winter Paradise.*
Pumpkin Sweet.	*Pumpkin Sweet.*	*Pumpkin Sweet.*	*Winter Paradise.*	*Shockley.*
Winter Paradise.	*Winter Paradise.*	*Winter Paradise.*	*Shockley.*	
	Traders.	*Shockley.*		

[3] Desirable only in the northern part of the Interior Low Plateau region.
[2] Desirable only in the southern part of the East Tennessee Valley region.
[1] Desirable only in the southern part of the Interior Low Plateau region.
[4] Desirable only in the northern part of the Allegheny Plateau region.

VARIETIES GROWN IN CERTAIN REGIONS OF THIS AREA, BUT NOT RECOMMENDED FOR GENERAL PLANTING.

Arkansas Black.	Arkansas Black.	Arkansas Black.	Arkansas Black.	Arkansas Black.
Babbitt.	Babbitt.	Babbitt.	Babbitt.	Babbitt.
Beach.	Beach.	Baldwin.	Baldwin.	Baldwin.
Berry Red.	Berry Red.	Beach.	Beach.	Beach.
Collins.	Collins.	Ben Davis.	Ben Davis.	Ben Davis.
Domine.	Domine.	Berry Red.	Berry Red.	Berry Red.
Ewalt.	Ewalt.	Collins.	Collins.	Collins.
Fallawater.	Fallawater.	Domine.	Domine.	Domine.
Fameuse.	Fameuse.	Ewalt.	Ewalt.	Ewalt.
Flora.	Flora.	Fallawater.	Fallawater.	Fallawater.
Lawver.	Ingram.	Fameuse.	Fameuse.	Fameuse.
Limbertwig.	Lawver.	Flora.	Flora.	Flora.
Mann.	Limbertwig.	Gano.	Gano.	Gano.
Missouri.	Mann.	Lawver.	Half Berry.	Lawver.
Ontario.	Missouri.	Limbertwig.	Lady Blush.	Limbertwig.
Pennock.	Ontario.	Mann.	Lawver.	Livland Raspberry.
Pryor.	Pennock.	Milan.	Limbertwig.	Mann.
Ralls.	Pryor.	Missouri.	Livland Raspberry.	Milan.
Red June.	Ralls.	Pennock.	Mann.	Missouri.
Salome.	Red June.	Pryor.	Milan.	Pennock.
Shackleford.	Salome.	Ralls.	Missouri.	Pryor.
Shockley.	Shackleford.	Red Astrachan.	Pennock.	Ralls.
Smith.	Shockley.	Red June.	Pryor.	Red Astrachan.
Springdale.	Smith.	Rhode Island.	Ralls.	Red June.
Striped June.	Springdale.	Rome Beauty.	Red Astrachan.	Rhode Island.
Tolman.	Striped June.	Salome.	Red June.	Rome Beauty.
Tompkins King.	Tolman.	Shackleford.	Rhode Island.	Salome.
	Tompkins King.	Smith.	Salome.	Shackleford.
		Springdale.	Shackleford.	Smith.
		Stark.	Smith.	Striped June.
		Striped June.	Striped June.	Tolman.
		Tolman.	Tolman.	Tompkins King.
		Tompkins King.	Tompkins King.	York Imperial.
			York Imperial.	

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